

HORTICULTURAL ABSTRACTS

Vol. XXII

June 1952

No. 2

Initialled abstracts and reviews not by Bureau staff are by D. W. P. Greenham, A. M. Massee, S. C. Pearce and W. A. Roach of the East Malling Research Station, C. W. S. Hartley, R. P. Jones, A. C. Shill and G. St.C. Feilden.

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MISCELLANEOUS.

General.

1125. U.S. DEPARTMENT OF AGRICULTURE.

Directory of Organization and Field Activities of the Department of Agriculture 1950, being *Agriculture Handbook 12*, Supt. Documents U.S. Govt. Printing Office, Washington 25, D.C., pp. 315, 65 cents.

An invaluable work for those wanting to keep in touch with particular agricultural work in the U.S.A. and in its overseas territories and possessions.

1126. U.K. AGRICULTURAL MISSION TO CANADA.

[Mimeo] Report of the U.K. Agricultural Mission to Canada 1950, pp. 117.

The report of the small team of experts headed by Sir William Ogg, who were the guests of the Canadian Government, makes extremely interesting reading, but except in the itinerary horticulture is hardly mentioned. Subjects of general interest discussed in the report include: farm machinery, marketing, extension work, its organization, scope and character, agricultural publicity, the relation of Government and farmer.

1127. LANCUM, F. H.

Wild mammals and the land.

Bull. Minist. Agric. Lond. 150, 1951, pp. 60, illus., 2s. 6d.

A beautifully illustrated account of the small wild animals of the U.K. and their relation, beneficial or harmful, to agriculture. Very roughly speaking the conclusions are reached that the brown rat is enemy No. 1, that the rabbit, grey squirrel, some voles and mice should also receive drastic treatment, that some measure of control must be applied to hares, that weasels, otters, badgers, foxes, red squirrels and others need watching but on balance are beneficial, and that the hedgehog and shrew are wholly beneficial.

1128. PAPADAKIS, J.

Posibilidades agrícolas de La Rioja, Catamarca, Tucumán, Salta, Jujuy, Corrientes, Santiago del Estero, Sudoeste de Buenos Aires, Sudeste de la Pampa y Noreste de Rio Negro. (The agricultural possibilities of certain districts in Argentina.) [Publ.] *Minist. Agric. B. Aires*, 1951, pp. 141, bibl. 3, illus., maps.

The climate, soils, irrigation facilities, stock and crops of 10 districts of Argentina are surveyed, recommendations being made on such subjects as suitable areas of production, methods of cultivation, introduction of new crops and organization of water supply, public services and co-operative associations. Special problems which require investigation are indicated.

1129. GALLAY, R., AND PERRAUDIN, G.

La sous-station fédérale d'essais en Valais. (The Federal Experiment Sub-station in Valais [Switzerland].) *Rev. romande Agric. Vitic.*, 1951, 7: 28-30, illus.

A sub-station of the Montagibert Federal Experiment Station, Lausanne, was established in 1947 in the Valais district to deal with local horticultural problems. At present it has a 12 ha. trial ground at Vétroz for work on pome fruits and 7.5 ha. at l'île des Écussons for that on stone fruits, vines and other horticultural crops. The most important points in its research programme are enumerated. These include the breeding of top fruit varieties adapted to the requirements of the district, selection of good lines of standard commercial varieties, clonal rootstock trials, breeding pure lines of seedling rootstocks, cultural experiments with top fruit and strawberries, selection of vine rootstocks, vine variety studies, selection and multiplication of strawberry stocks and asparagus selection.

130. NISSEN, Ø.

En plan for faktorielle forsøk med hovedvekten på bestemmelse av samspillene. (The design of experiments with special reference to the interaction of several factors.) [English summary 13 lines.]

Forskn. Landbruk., 1951, 2: 203-14, being *Meld. Åkervekstfors. Norg. LandbrHøgsk.* 143.

Two different designs are discussed. In both, two different experimental factors are used on long, narrow lots, superimposed at right angles on the same area. The second design, which is new, is applicable when the use of long, narrow plots is desirable so that no allowance need be made for turning space for farm machinery. [From author's summary.]

131. KELLER, K. R.

Relative efficiency of rectangular and triple rectangular lattice designs using hop uniformity trial data.*

Agron. J., 1951, 43: 93-6, bibl. 5.

Efficiency varied from 109.9 to 127.7 for rectangular lattices and from 124.5 to 144.3 for triple rectangular lattices. All plots contained five hills. [For other relevant papers, see *Ibidem*, 41: 389-92, 569-73 and 43: 243-5; *H.A.*, 19: 3270, 20: 948 and 21: 3782.] S.C.P.

132. FERGUSON, W., SPANGELO, L. P., AND CAMERON, D. F.

Horticultural plant breeding in Canada.

Reprinted from *Z. Pflanzenzücht.*, 1951, Vol. 30, No. 1, pp. 8, bibl. 12.

Breeding experiments in Canada have followed the general lines of hybridization of suitable parent species followed by selection of F_1 seedlings and in some cases intervarietal hybridization. In vegetables the aims have included earliness and suitability for canning in peas, tomatoes, melons, sweet corn and broccoli and disease resistance in tomatoes, potatoes and peas. In fruit Saunders's original apple crosses were of *Malus baccata* by commercial varieties and the chief aim hardness, but in addition other aims have been apple scab and crown rot resistance, pear fireblight resistance, and the production of strawberries resistant to red stele and black currants to white pine blister rust. As regards ornamentals, *Rosa*, *Syringa*, *Malus*, *Lilium* and *Iris* continue to be subjects of breeding research. Among the chief centres of horticultural breeding research are Ottawa, Summerland, Agassiz and Kentville.

133. BANGA, O.

Bescherming van de kwekerseigendom. (Protection of plant breeders rights.) (English summary $\frac{3}{4}$ p.)

Meded. Dir. Tuinb., 1951, 14: 636-46.

The Plant Patent Act 1930 in the U.S.A., the Plant Breeders Decree 1941 in the Netherlands, and the foundation of a "catalogue" and the application of "la loi sur la répression des fraudes" to the trade in varieties of plants in 1949 in France, are three important steps in the development of the protection of breeders'

* This abstract was inadvertently omitted from *H.A.*, vol. 21, no. 4.

rights based on civil law. Nomenclatural rights of varieties are discussed in detail in the present article.

Effect of light.

(See also 1593-1595, 1745, 1784, 1785, 1922, 1923.)

1134. LEOPOLD, A. C.

Photoperiodism in plants.

Quart. Rev. Biol., 1951, 26: 247-63, bibl. 107.

This is a review of the subject discussed under the headings: 1. The basis of photoperiodism, (a) the nature of the stimulus and the response, (b) photoperiod classes (with examples of long-day and short-day plants). 2. Metamorphosis to the flowering condition, (a) role of light, (b) role of dark, (c) role of temperature, (d) role of inorganic nutrients, (e) role of auxins, (f) role of metabolites, (g) role of growth. 3. The nature of the proposed flowering hormone, (a) origin, (b) movement, (c) persistence, (d) inhibition and destruction. 4. Theories to explain photoperiodism. 5. Conclusions.

1135. WASSINK, E. C., AND VAN DER SCHEER, C.

On the study of the effects of light of various spectral regions on plant growth and development.

Proc. kon. ned. Akad. Wetensch., 1950, 53: 1064-72, bibl. 6.

An apparatus is described which makes it possible to illuminate higher plants for long periods with light of limited spectral regions. The equipment is suitable for photoperiodic and photoformative studies, but the intensities are not high enough for the cultivation of most higher plants in coloured light only.

1136. ASHBY, E.

Studies in the morphogenesis of leaves. VI. Some effects of length of day upon leaf shape in *Ipomoea caerulea*.

New Phytol., 1950, 49: 375-87, bibl. 17, illus.

In 16-hr. days plants began to flower at the 15th-16th node after 43-49 days, and lobing began at the 5th-7th leaf. In 8-hr. days plants began to flower at the 1st node after 26 days, and lobing was almost entirely suppressed. In 8-hr. days with interrupted nights the morphology of the plants resembled that of those grown in 16-hr. days, though they flowered somewhat earlier and the lobings were somewhat different. The ratio of leaf-blade length to petiole length is unaffected by length of day. The data are discussed in relation to Krenke's theory of cyclic ageing and rejuvenation in plants.—Manchester Univ.

1137. ROBERTS, R. H.

Induction and blossoming of *Xanthium*.

Science, 1951, 113: 726-8, bibl. 12, illus.

Recent studies in Wisconsin indicate that induction and flowering may have a marked degree of independence, even in *Xanthium*. The fact that short days influence both the induction stimulus and floral development is thought to be responsible for the idea commonly held that the induction stimulus is the controlling factor in the blossoming of plants, whereas it would now appear that induction and flower formation are not cause and effect but simultaneous phenomena.

1138. GERRETSEN, F. C.

Studies in photosynthesis. IV. Redoxpotentials and corresponding pH changes in illuminated crude chloroplast suspensions.
Plant and Soil, 1951, 3: 1-30, bibl. 30.

Observations are recorded on the changes noted at Groningen in the pH and in the redoxpotential of crude chloroplast suspensions during illumination and in the dark under aerobic and anaerobic conditions.

Growth phenomena.

1139. STEWARD, F. C., CAPLIN, S. M., AND MILLAR, F. K.

Investigations on growth and metabolism of plant cells. I. New techniques for the investigation of metabolism, nutrition and growth in undifferentiated cells.
Ann. Bot. Lond., 1952, 16: 57-77, bibl. 25, illus.

This paper describes a technique for comparisons of the metabolism of rapidly growing and non-growing tissues. The requisite conditions for such studies are discussed. Active tissue growth is obtained by using aseptic conditions and a complete nutrient medium with coconut milk added. Rapid diffusion and gas exchange is obtained by using special tubes in which the tissue and medium are rotated in the presence of a large volume of air. Modifications are described which enable various types of metabolic treatment to be used, including the use of tracer carbon. The tissue principally described is carrot phloem, but various other possibilities including the use of micro-organisms are envisaged. [Authors' abstract.]—Univ. Rochester and Cornell Univ., N.Y.

1140. STANT, M. Y.

The shoot apex of some monocotyledons. I. Structure and development.
Ann. Bot. Lond., 1952, 16: 115-28, bibl. 21, illus.

The structure of the apex of 5 genera of monocotyledons was investigated, e.g. *Elodea densa*, *Convallaria majalis*, *Carex hordeistichos*, *Luzula sylvatica* and *Narcissus pseudo-narcissus*. The relationship of the growing point to the youngest leaf primordium is described, and problems of leaf initiation are briefly discussed.

1141. STERLING, C.

Origin of buds in tobacco stem segments cultured *in vitro*.
Amer. J. Bot., 1951, 38: 761-7, bibl. 36, illus.

The author presents an anatomical description of controlled initiation of shoot primordia on tobacco stem segments cultured *in vitro*, and considers their development in relation to general problems of meristematic activity and dedifferentiation.

1142. CHOUARD, P.

Dormances et inhibitions des graines et des bourgeons; préparation au forçage; thermopériodisme. (Dormancy and growth inhibition of seeds and buds; preparation for forcing; thermoperiodism.)
Mimeo. Centre de Documentation Universitaire, Paris, 1951, pp. 157, bibl. 470, illus., 600 fr.

This paper on dormancy and growth inhibition, with its extensive bibliography, will be invaluable to student and research workers. In it the author orientates our present knowledge on germination, dormancy, storage and longevity of seeds, growth inhibition of buds, breaking of dormancy and forcing, and dormancy of rhizomes, tubers and bulbs, and brings under review the most important literature on the subject. A special section is devoted to Dutch work on bulb forcing and thermoperiodism. At the same time an attempt is made both to interpret the facts and to indicate their horticultural significance.

1143. WHATLEY, F. R.

Coenzymes in plants.
New Phytol., 1951, 50: 244-7, bibl. 21.

Stable preparations containing a number of coenzymes have been made from the tissues of several species of flowering plants, including potato leaflets, young potato tubers, and runner bean leaflets.—Cambridge Univ.

1144. LECAT, P.

Répartition et variations du système ascorbique chez les végétaux. (Distribution and variations in the ascorbic system in plants.)
Plant and Soil, 1951, 3: 267-308, bibl. 30.

The author discusses the variations in the higher plants of ascorbic acid and dehydroascorbic acid, their relations to one another and their equilibrium, which they term the ascorbic acid quotient of reversible oxidation. He follows the variations in leaves of a large number of plants including black currant, parsley, *Arum maculatum* and others, in flowers of the iris, arum lily and in fruits of the tomato, *Rosa canina*, Montmorency cherry, lemons and other citrus, beans, oil seeds and the almond, and he considers how light and temperature affect these variations. His observations confirm the opinion of other workers that the role of the ascorbic system is (1) to check, as may be necessary, oxidation and reduction phenomena in tissues, (2) as a carrier of hydrogen in certain common phenomena of respiration, (3) as a carrier of hydrogen during chlorophyll assimilation. [From author's summary.]

Growth substances.

(See also 1189, 1192i, m, t, w, 1202, 1206, 1215, 1232, 1237, 1303a, 1488-1498, 1499a, b, 1598-1600, 1630, 1669, 1764g, 1796-1798, 1803, 1886, 1887.)

1145. LINSER, H., AND KAINDL, K.

The mode of action of growth substances and growth inhibitors.
Science, 1951, 114: 69-70, bibl. 8.

Experiments of two Austrian workers at Linz lead them to propound the following ideas in explanation of their results: "The growth-inhibiting or growth-promoting substances must be converted into a part of the living substance, being adsorbed by molecules of 'living structure'. It is reasonable to postulate that in the molecular system of the living substance there are spaces that can be occupied by the molecules of the growth regulator. This means that the molecule of the growth regulator has a certain affinity for a certain 'space'. Our hypothesis postulates two kinds of spaces: the first filled in by growth substances effects

growth promotion; the second type also shows a certain affinity, but in this case growth inhibition suits."

46. RHOADES, A., AND ASHWORTH, R. DE B.
Mode of action of growth regulators in plants.

Nature, 1952, **169**: 76-7, bibl. 5.

Whatever the mechanism involved", the authors point out, "the metabolism of indole-3-acetic acid or its precursors may generate energy-rich phosphate bonds, and this access of energy may be the prime factor in the initiation of the growth response."

147. EBERTS, F. S., JR., BURRIS, R. H., AND RIKER, A. J.

The effects of indole-3-acetic acid and common organic acids on the respiration of slices from tomato stem and crown gall tissue.

Amer. J. Bot., 1951, **38**: 618-21, bibl. 14.

The action of organic acids on tomato stem slices and crown gall slices has been studied. Most of the acids tested increased respiration of untreated stem and gall tissue slices both at 27° C. and 32° C. In no case tested did the organic acids appreciably reverse the inhibition induced by 10⁻³ M indole-3-acetic acid. This inhibition of respiration by indole-3-acetic acid and the metabolism of organic acids in mature tomato stem and gall tissues appeared independent. Stem and crown gall slices at 27° C., where galls develop, and at 32° C., where they do not form, behaved alike toward organic acids and indole-3-acetic acid. [Authors' summary.]—Univ. Wisconsin.

148. FROHBERGER, E.

Zur Wirkung der 2,4-Dichlorphenoxyessigsäure auf Gewebe und Stoffwechsel der Pflanzen. (The effect of 2,4-dichlorphenoxyacetic acid on the tissue and metabolism of plants.)

Höfchen Briefe, 1951, **4**: 236-87, bibl. 82.

The principles of selective toxicity of 2,4-D and its mode of action were examined. The reactions of both monocotyledons and dicotyledons to 2,4-D treatments are enumerated.

149. MITCHELL, J. W., SKAGGS, D. P., AND ANDERSON, W. P.

Plant growth-stimulating hormones in immature bean seeds.

Science, 1951, **114**: 159-61, bibl. 6.

In the work described ether-soluble hormones obtained from the immature seeds of Black Valentine bean plants were applied to Black Valentine seedlings. Vegetative growth was accelerated and flowers developed 3-5 days earlier than on untreated plants. The size of response varied according to the stage of development of the seeds providing the extracts. The hormones were found to increase rapidly in the seeds after the 4th day following pollination, reaching a maximum on the 7th or 8th day and then decreasing rapidly to an infinitesimal amount on the 15th day. The growth of the seeds and of the treated bean plants was observed and is discussed.

1150. OSBORNE, D. J., AND WAIN, R. L.

Plant growth-regulating activity in certain aryloxyalkylcarboxylic acids.

Science, 1951, **114**: 92-3, bibl. 8.

Results of these English workers indicate that, in general, the α -(aryloxy)-iso-butyric acid structure is not associated with high growth-regulating activity.

1151. NAUNDORF, G.

Formación de pelos radicales en relación con la auxina. (The effect of auxins on the formation of root hairs.)

Acta agron. Palmira, 1951, **1**: 205-11, bibl. 9.

Data are presented to show that the primary roots of *Helianthus annuus* exposed to light have a higher auxin content than those grown in darkness and that, as a consequence, they have more root hairs. Exposure of the roots for as long as 15 hours, however, caused an inhibition of root hair formation. Treatment of the roots with heteroauxin (10⁻⁹ to 10⁻¹² M solution) for 5 hours increased growth of the primary roots and the number of root hairs. Extraction of auxin from the endosperm and cotyledons of cereal and bean seeds caused a reduction in the number of root hairs formed on the primary root after germination. Varieties of wheat with a low auxin and biotin content in the seed produced primary roots with fewer root hairs than those with a high content. Seed treatment with a mixture of nutrient substances, minor elements, fungicides and hormones improved root hair formation.

1152. MURNEEK, A. E.

Growth regulators during fertilization and post-fertilization periods.

Palest. J. Bot. (R), 1951, **8**: 8-19, bibl. 99.

This condensed review of the literature provides a summary of the present status of research on the function of hormones in the sexual reproduction of some plants. The subject is dealt with under the following headings: fruit setting, fruit thinning, embryo development and fruit growth, evidence from embryo culture, the endosperm and its role, the relation of hormones to fruit thinning, increase in fruit size and speed of maturity, and control of preharvest fruit drop. The paper was originally read at the symposium on "Physiological aspects of growth-regulators, with special reference to reproduction", at Columbus, Ohio, September 1950.

1153. VAN OVERBEEK, J., BLONDEAU, R., AND HORNE, V.

Trans-cinnamic acid as an anti-auxin.

Amer. J. Bot., 1951, **38**: 589-95, bibl. 33, illus.

Trans-cinnamic acid antagonizes the growth-promoting effect of auxins in the pea stem section test. Its action has the nature of a competitive inhibition. At 15 p.p.m. its action is completely reversible by the auxins 2,4-D, naphthaleneacetic acid, *cis*-cinnamic acid, and indoleacetic acid. In order to compensate for the anti-auxin effect of a given quantity of *trans*-cinnamic acid, it requires 1 undissociated molecule of 2,4-D, against 10 of naphthaleneacetic acid, 100 of *cis*-cinnamic acid, and 500 of indoleacetic acid. This proportion may reflect the affinity of the various auxin molecules to the specific proteins with which

auxins are believed to combine; 2,4-D having the highest affinity. This, in turn, may help in explaining the relative efficiency of the various auxins as expressed by their relative position in the activity-concentration diagram. [Authors' summary.]—Shell Oil Co., Modesto, Calif.

1154. LEOPOLD, A. C., AND KLEIN, W. H.
Maleic hydrazide as an antiauxin in plants.
Science, 1951, 114: 9-10; bibl. 10.

A discussion of some of the phenomena when maleic hydrazide is used and a comparison of them with those seen when certain other antiauxins are used. Reference is made to a paper by the same authors in *Plant Physiology* [not yet seen] on its anti-auxin properties.

1155. GREULACH, V. A.
The effect of maleic hydrazide on tomato plants in relation to their age at the time of treatment.
Plant Physiol., 1951, 26: 848-52, bibl. 6.

Tomato plants were sprayed at different ages with 2,000 p.p.m. of the diethanolamine salt of maleic hydrazide. Complete growth inhibition occurred within 2 weeks for plants 3 or 4 weeks old at time of treatment, within 3 weeks for plants 5 or 6 weeks old, and within 4 weeks for plants 7 weeks old. The amount of growth between treatment and complete cessation of growth increased linearly with age at treatment. Maleic hydrazide inhibited the increase of stem diameter of plants treated when 3, 4 or 5 weeks old, but not that of plants treated when 6 or 7 weeks old. All treated plants, and particularly those treated when 3 weeks old, had a higher shoot/root ratio than the controls. It is suggested that this marked inhibition of root growth was due to interference with translocation of food to the roots.

1156. BERTOSI, F.
L'idrazide maleica come fitomone. (Maleic hydrazide as a growth substance.)
Atti Ist. bot. Univ. Pavia, 1950, Ser. 5, 8: 155-66, bibl. 14.

The author describes his tests with various plants including tomato. Adult tomato plants growing in Knop's solution which contained from 1,000 to 62.5 p.p.m. of maleic hydrazide showed retardation of flower bud formation without inhibition of growth. Among other plants used were white lupins and Jerusalem artichokes. He concludes that it cannot be considered a typical growth substance.

1157. WHITE, D. G.
Agricultural uses for maleic hydrazide.
Agric. Chemls, 1952, 7: 1: 40-3, 111, bibl. 4, illus.

Maleic hydrazide was first synthesized in 1895 but the possibility of using the compound for agricultural purposes was first raised in a report published in 1949 [see *H.A.*, 19: 2680]. In horticulture it is used as a herbicide, as a sprout inhibitor for stored potatoes, onions and carrots, for delaying blossoming, for fruit thinning, for the production of dwarf fruit trees, and to inhibit the development of strawberry runners. Maleic hydrazide has been reported to act as a systemic fungicide against certain species of *Alternaria*, also as a

bactericide in preventing gall formation by a *Phytomonas* species on tomato plants.

Radioactive substances.

1158. RIRIE, D., AND TOTH, S. J.
Plant studies with radioactive calcium.
Soil Sci., 1952, 73: 1-10, illus.

The relative availability to tomato plant of Ca^{45} from a mixture of three tagged Ca salts, its movement within the tomato plant, and its distribution within leaves of tomato, alfalfa, red clover, and wheat plants were studied. Greater amounts of Ca^{45} were present in the lower than in the upper leaves of plants, but more was present in the upper than in the lower stems. Split root studies with tomatoes indicated little transfer of Ca^{45} from roots immersed in solutions containing Ca^{45} to roots of the same plant immersed in standard nutrient solutions containing varying levels of Ca.—New Jersey agric. Exp. Stat.

1159. SIMONOV, I. N., AND MIRONOV, E. V.
The translocation of radio-active phosphorus in fruit, berry, and citrus plants.
[Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1951, 16: 12: 40-3, illus.

The translocation of radio-active phosphorus was studied by growing seedlings for a week in a solution containing P^{32} and determining the distribution of the P^{32} in leaves, roots, stems, and growing points of a number of fruit plants. Radio-photographs are shown of a number of seedlings, including strawberry, black currant, apple, and fig.

1160. WITTWER, S. H., AND LUNDAHL, W. S.
Autoradiography as an aid in determining the gross absorption and utilization of foliar applied nutrients.
Plant Physiol., 1951, 26: 792-7, bibl. 3, illus., being *J. Art. Mich. agric. Exp. Stat.* 1233.

A method is presented of simultaneously preparing a large number of autoradiograms of entire plants, so that the intensity of the images is within limits proportional to the concentration of the radioactive material in the tissues. Autoradiograms of bean, maize and tomato plants demonstrate that leaves are efficient organs for absorption of radio-phosphorus. Subsequent distribution in the bean plant of the foliar applied radio-phosphorus is comparable to that of similar material taken up by roots. A relatively greater nutrient absorption efficiency of the younger expanding leaves is suggested.

1161. SEAY, W. A.
Use of collodion coverings to prevent crumbling and dusting of radioactive plant pellets.
Agron. J., 1951, 43: 570-1, bibl. 1.

Radioactivity in plant tissue can be determined rapidly by using pelleted plant material. It was found that by dipping the pellets in a collodion-ether solution and allowing them to dry, crumbling was prevented. This facilitated handling and prevented contamination of laboratory equipment and atmosphere.

Nutritional problems.

(See also 1192b, j, k, n, r, u, 1221, 1274, 1292, 1314-1321, 1504-1507, 1555, 1790-1793, 1985.)

1162. WANG, T. L.

Nouvelle méthode de dosage des éléments minéraux fertilisants du sol par les *Azobacter*. (A new method of determining the amount of nutritional elements in the soil by *Azotobacter*.)

Plant and Soil, 1951, 3: 41-6, bibl. 2.

The writer, noting the principle of the method, describes its application and discusses its uses. He finds it particularly useful for phosphorus determinations. He notes its extreme simplicity.—Institut Pasteur, Laboratoire de Microbiologie technique.

1163. PIJLS, F. W. G., AND DEN DULK, P. R.

Boriumvergiftiging van planten. (Boron toxicity in plants.) [English summary $\frac{1}{4}$ p.] *Meded. Dir. Tuinb.*, 1951, 14: 915-18, bibl. 2.

The symptoms of boron poisoning in a number of horticultural crops are briefly mentioned, and common crop plants are tabulated to show their relative susceptibility to boron poisoning. To prevent boron injury it is recommended that no more than 25 kg. of borax per hectare be applied.

1164. BEAR, F. E., AND OTHERS.

Magnesium in plants and soils.

Bull. N.J. agric. Exp. Stat. 760, 1951, pp. 24, bibl. 42, illus.

Approximately 10% of the exchange complex of an "ideal soil" should be occupied by Mg. Magnesium-deficiency symptoms are likely to develop when this percentage falls below 6, or when the K: Mg ratio in the exchange complex exceeds 1:2. With Rutgers tomatoes, grown in sand culture at the New Jersey Agricultural Experiment Station, it was found that a 1:1 K-Mg ratio was best at the transplanting stage, a 20:1 ratio at the pre-blossom stage, and a 5:1 at the fruiting stage, but all three ratios gave good growth of plants and yield of fruit. Yields of potatoes, sweet potatoes, snap beans and okra, grown in outdoor cylinders in Mg deficient soil, were greatly increased by Mg applied in 4 different forms. Generally it is thought desirable to apply a Mg equivalent of not less than 40 lb. MgO per acre annually to crops in Mg-deficient areas of New Jersey.

1165. JONES, L. H. P., AND LEEPER, G. W.

Available manganese oxides in neutral and alkaline soils.

Plant and Soil, 1951, 3: 141-53, bibl. 12; 3: 154-9, bibl. 11.

Oxides of the structures manganite, manganous manganite and pyrolusite cured manganese deficiency in peas in experiments at the School of Agriculture, Melbourne University. They all consisted of very small particles, as shown by electron micrographs. The amount of oxide dissolved from the substances by aqueous quinol in an hour at room temperature was correlated with their ability to supply plants with manganese. The authors describe how the available oxides are estimated, by first treating with alcoholic quinol, then washing with alcohol and finally extracting with semi-molar calcium nitrate.

1166. STOUT, P. R., AND OTHERS.

Molybdenum nutrition of crop plants. I.

The influence of phosphate and sulfate on the absorption of molybdenum from soils and solution cultures.

Plant and Soil, 1951, 3: 51-87, bibl. 30.

Experiments in California showed that 1 lb. per acre of molybdenum added to soils as Na_2MoO_4 is reflected in large increases in the molybdenum absorbed by plants. If phosphate levels of the soil are increased at the same time, the molybdenum absorption is very greatly increased. In the presence of sulphates this absorption decreases, probably because the two ions compete directly for adsorption spots on the root during the first stages of absorption, since molybdenum ions are divalent and of the same size as sulphates. But an explanation of the phosphate effect must be sought in biochemical processes involving the two ionic species, and these are briefly discussed. The observations bring out some of the important chemical features of soils and culture solutions governing molybdenum absorption by plants from levels of molybdenum supply adequate for their needs. Another paper is in preparation on phenomena accompanying molybdenum deficiencies in different plant species in Californian soils.

1167. GILBERT, F. A.

The place of sulfur in plant nutrition.

Bot. Rev., 1951, 17: 671-91, bibl. 109.

The value of sulphur as a plant nutrient has been under-estimated. Sulphur occurs in plants chiefly in proteins, volatile compounds and sulphates. The amount varies considerably in different families and genera, brassicas being very rich in the element. The effects of S deficiency in many ways resemble those caused by a deficiency in N. S-deficient plants are higher in N, soluble S compounds and starch, and lower in sugars than plants with sufficient S. S deficiency in the navel orange is characterized by an abnormal yellowing of the new-cycle growth. Most of the deficient fruits show reduced juice content and abnormally thick rinds. The only named deficiency disease attributed with certainty to a lack of S is the "tea yellows" of Nyasaland. Any type of organic or inorganic fertilizer which contains S in an available form will cure "yellows". The importance of S for animals and its soil corrective properties are also discussed.

1168. HOYLE, D. A., AND MATTINGLY, G. E. G.

Soluble and available nitrogen in manurial composts.

Nature, 1952, 169: 116-17, bibl. 7.

Results obtained during investigations at Reading University emphasize the importance of "water-soluble" N during composting, and confirm the fact that the close relation between soluble and available N found for other organic manures holds also for compost.

1169. YUEN, S. H., AND POLLARD, A. G.

The technique and application of plant tissue tests for the availability of soil phosphate.

J. Sci. Food Agric., 1951, 2: 537-42, bibl. 19.

In preliminary work stems of buckwheat, potato and haricot bean, and petioles of carrot, clover and polygonum were examined, while in the main tests flax grown on a series of long-term fertilizer plots was used.

Soil problems.

1170. KLAPP, E.

Leistung, Bewurzelung und Nachwuchs einer Grasnarbe unter verschiedenen häufiger Mahd und Beweidung. (Yield, root development and growth of a grass sward as affected by mowing and grazing at various intervals.)

Z. Acker- u. Pflanzenb., 1951, 93: 269-86, bibl. 25, illus.

After one year's development, a grass-clover sward was for 4 years subjected to the following treatments: grazing 8, 11 and 20 times; mowing-grazing; mowing 3, 4, 5 and 19 times. Data are given for yield, chemical and botanical composition, rooting and after-effect of the various treatments. Frequent mowing or grazing decreased the yield of herbage and restricted root development. Amounts of root at the end of the trial are expressed in terms of dry matter in the zones 0-5, 5-10, 10-15, 15-20, 20-30, 30-40 and 40-50 cm., and these data show that the depressant effect of frequent mowing or grazing becomes greater with increasing depth. Frequent defoliation thus results, not only in a reduction of the total amount of root, but also in a greater concentration of the root in the surface zone. [This finding is of interest in connexion with the management of grassed orchards in such a way as to reduce competition of the grass with the tree.—Abstractor's note.] D.W.P.G.

1171. DE VILLIERS, G. D. B.

Soil temperature data for Stellenbosch and Groot Drakenstein.

Sci. Bull. Dep. Agric. S. Afr. 309, 1951-2, pp. 87, bibl. 3, illus., being *Fruit Res. Tech. Ser.* 27.

The diurnal and seasonal temperature variations of two orchard soils in the Western Cape Province were studied. The technique for the thermo-electric measurement and photographic registration of soil temperature is described in part I of this bulletin, and the data, obtained in an orchard soil at Stellenbosch during one year, are presented and discussed. In part II the soil temperature data recorded over a period of 6 years at the Agro-Meteorological Observatory, Groot Drakenstein, are analysed, using distant self-recording mercury-in-steel thermometers.

1172. FAURE, —

Essais d'irrigation souterraine. (An experiment with sub-soil irrigation.)

Terre maroc., 1951, 25: 362-5, illus.

An experimental sub-soil irrigation system installed by a M. Moreau at Ouled Teima in Morocco is described, in which the water is distributed by 10 cm. wooden pipes set at a depth of 60 cm., 1-20 m. apart. In trials with vegetable crops, very good yields have been obtained and growth has been exceptionally rapid. Radishes, for example, were reaped 13 to 19 days after sowing; potatoes harvested in 64 days yielded 26 times the seed planted; and tomatoes planted out in February matured in 79 days and planted out in April in 58 days. The apparent advantages of the system are discussed and suggestions are made for adapting it to large-scale use.

1173. WOODS, J. J.

A report on irrigation experiments.

Mimeo. Saanichton Domin. exp. Stat. 124, 1951, pp. 10.

One year's experiments still in progress receive a preliminary report. Crops to which irrigation was applied were: strawberries, loganberries, raspberries, gladioli, tulips, daffodils, irises (Wedgewood), hyacinths, cauliflowers, potatoes and pasture. Only general but interesting indications are noted as yet and several more years' work will be necessary before definite recommendations are possible for the different crops.

1174. KRAMER, P. J.

Causes of injury to plants resulting from flooding of the soil.

Plant Physiol., 1951, 26: 722-36, bibl. 22, illus.

A series of experiments was carried out with tomatoes, sunflowers, tobacco and poplar to determine how flooding the soil in which plants are growing causes injury or death of the shoots. The degree of injury was least in sunflower, which was the first species to develop adventitious roots after flooding, and greatest in tobacco, which was the slowest to develop adventitious roots. While lack of water might explain the death of the leaves, it cannot explain such characteristic effects of flooding as curvature of the leaf petioles, hypertrophy of stems at the water line, or development of adventitious roots. Flooding probably stops downward translocation of carbohydrates and auxin, and possibly their accumulation at the water line is responsible for hypertrophy and development of adventitious roots. Accumulation of auxin in the lower half of the stem might also be responsible for the epinastic curvature of the leaves and petioles. The injury and death of the leaves may be caused at least in part by toxic substances moving up from the dead roots or even from the surrounding soil. It is believed that injury to the shoots of flooded plants is complex in origin and has several causes and does not result simply from interference with water absorption.—Duke Univ., Durham, N.C.

1175. HASKELL, G.

pH tolerance and polyploidy in angiosperms.

Plant and Soil, 1951, 3: 223-38, bibl. 22.

Most dicotyledons and monocotyledons have an optimum pH range between 6.0 and 6.9. There is no difference for ploidy in dicots but in monocots there is a somewhat higher proportion of polyploids to diploids whose optimum pH ranges lie between 7.0 and 8.9. The literature on the relation of polyploidy to plant nutrition, soil requirements and plant distribution is reviewed. The author [of the John Innes Horticultural Institution, Bayfordbury, England] considers that the study of chromosome number of plant species in relation to the ecological habitat needs further investigation.

1176. ANON.

Revolutionary synthetic organic?

Fruitgrower, 1952, No. 2924, pp. 54-5, illus.

Information is given on a new chemical soil conditioner, described as a poly-electrolyte and called Krilium,

which is stated to be more effective in improving soil structure than compost, manure or peat moss and to control soil erosion. In trials in the United States Krilium produced up to 100% yield increases in radishes and carrots. Tests have also indicated that the material may be beneficial for glasshouse soils.

Cultivation under special conditions.

(See also 1592, 1764e.)

1177. TICQUET, C.

Soilless culture.

Fruitgrower, 1952, No. 2923, p. 15.

A simple method is described which enables plants to be grown in water culture without testing or frequently changing the solution. Calculation of the amount of salts to be supplied is based on the estimated weight of a fully grown plant. It has been found that for practical purposes the total weight of salts supplied in the nutrient solution during the season should be about one-twentieth of the total weight of vegetable matter, without the roots. The total salt requirement is then divided by the number of feeds the plant will receive during its whole growing period, the amount being added to the solution at regular intervals. For best growth a weekly feed with a complete change of solution once a month is recommended.

1178. ARTHUR, J. M.

Growing plants in artificial climates.

Reprinted from *Sthn Chem.*, 1949, 8: 266-70, illus., being *Repr.* 663 [received 1951].

A popular review of the work carried out at the Boyce Thompson Institute, N.Y., on growing plants under controlled conditions of light, temperature and CO₂ supply. The notes relate mainly to experiments with tobacco and certain agricultural crops, but the photo-periodic treatment of ornamentals is also mentioned.

1179. ZIMMERMAN, P. W.

Impurities in the air and their influence on plant life.

Reprinted from *Proc. 1st nat. Air Pollution Symposium*, 1949, Pasadena, 1950, pp. 135-41, bibl. 23, illus. [received 1952].

A brief review is given of the work done at the Boyce Thompson Institute on the effects of toxic impurities in the air, e.g. sulphur dioxide, hydrogen fluoride, chlorine, hydrogen sulphide, ammonia, mercury vapour, ethylene and carbon monoxide, on various plant species.

Practical devices.

(See also 1192a, 1989.)

1180. HUNTER, A. S.

A versatile fertilizing and seeding machine for experimental plots.

Agron. J., 1951, 43: 575-9, bibl. 6, illus., being *Tech. Pap. Ore. agric. Exp. Stat.* 687.

A description and detailed constructional diagrams are given of a machine that is capable of simultaneously applying fertilizers in bands and seeding practically any common vegetable or field row crop, or of performing either operation alone. It is self-powered, highly manoeuvrable, compact and light. It is

capable of applying fertilizers at a rate of more than 100 plot-rows (30-40 ft. long) per hour.

1181. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

Wolseley bell shape electric fencer and strip grazing equipment.*

Rep. nat. Inst. Engng RT 38/50072, 1950, pp. 12 [received 1951].

The average times taken to erect 150 yards of fencing by one man were 11.7 min. under favourable and 17.2 min. under relatively unfavourable conditions and the corresponding times for moving were 15.3 and 20.4 min. It was found effective in controlling stock. Three minor modifications are recommended.

1182. MINISTRY OF AGRICULTURE, LONDON.

Farm gates.

Fixed Equipment Fm Leaf. Lond. 8, 1951, pp. 19, illus.

An invaluable bulletin for the practical-minded man. Diagrams, measurements and detailed instructions are given on the making, erection and maintenance of the most useful farm gates.

1183. ABBISS, H. W., AND CRAZE, S. P.

Influence of storage and production temperatures on some horticultural crops.

Agriculture, Lond., 1952, 58: 471-7.

A discussion with examples taken mainly from work at the Gulval Experimental Station, Cornwall, of the great use which can be made of stores in which temperatures can be controlled as between 28° F. and 100° F. for both warming and cooling seeds, plants, bulbs, fruits, and cut flowers. By such treatment the author indicates how it is possible to extend the period of marketing of fruits, vegetables and flowers, to overcome gluts or take advantage of shortages. His examples include the breaking of dormancy in potato seed by warming, inducing earlier flowering in bulbs by varying the storage temperature, optimum cooling process for bulbs, warm storage and pre-cooling treatment of Wedgwood irises.

1184. DRESDE, G.-K.

Progrès techniques dans l'aération des couches. (Technical progress in frame ventilation.)

Rev. hort. suisse, 1951, 24: 123-4, illus.

The new Welbers system of ventilating frames is described and illustrated. It can be used on wooden or concrete frames. By pulling a lever, up to 40 lights can be opened at once and there is no danger of wind damage.

1185. VAN DEN MUIJZENBERG, E. W. B.

De kas als kweekmilieu. (Glasshouse environment and growth.) [English summary ½ p.]

Meded. Dir. Tuinb., 1951, 14: 691-706, bibl. 47, illus.

The total area under glass all over the world, used for horticultural crops is approximately 12,000 ha., of which a quarter is in the Netherlands. The factors affecting the growth of plants under glass are dealt with:

* Made by Wolseley Sheep Shearing Machine Co. Ltd., Witton, Birmingham 6.

illumination, temperature, water, air, CO₂ and chemicals (for nutrition and for plant protection). The changed requirements of glasshouse construction, heating, ventilating, air conditioning and supply of chemicals are discussed. The use of mercury lamp illumination is stressed. Atomization to increase the moisture content of the glasshouse and to distribute plant protection products, and the artificial increase of CO₂ in diffusion-proof glasshouses are mentioned.

1186. ANON.

Planning Commission considers development programme for agricultural implements and machinery.

India Trade J., 1951, 179: 1320, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 459.

It is estimated that India requires 30,000 diesel machines a year for irrigation purposes and 10,000-15,000 tractors of various sorts. At present there are 231 factories manufacturing agricultural implements, exclusive of those producing pumps and diesel engines. It is recommended that technical and economic aspects of manufacture and the utilization of tractors should be investigated.

1187. SPOELSTRA, P. A.

Grondstomen. (Steam sterilization of soils.) [English summary 9 lines.]

Meded. Dir. Tuinb., 1951, 14: 566-75, bibl. 5, illus.

There is no important difference in effect between high and low pressure in steam distribution for sterilizing soil. The differences in equipment for high or low pressure are explained. For many growers it is advantageous to steam the soil themselves with low pressure steam produced in the boilers used for heating. It is recommended that the soil should be covered with heat insulating materials during the steaming process.

1188. VAN DER WANT, J. P. H.

De electronenmicroscop en zijn betekenis voor biologisch onderzoek. (The electron-microscope and its importance in biological investigations.)

Meded. Dir. Tuinb., 1951, 14: 363-71.

An account is given of the electron microscope—its structure, the preparation of material for examination, and its application in biological investigations. Observations made in Holland are mentioned and three photographs of plant viruses are included.

1189. HENDERSON, J. H. M., AND HUNT, D. L.

A simple humidifying system for a small high-humidity room.

Science, 1951, 114: 262-34, illus.

Particulars with diagrams are given of the setting up and manipulating of a spray-atomizer-type humidifier which proved highly successful in an *Avena* room.

1190. PRAKKEN, R., AND SWAMINATHAN, M. S.

Experience with the hydroxyquinoline smear method.

Meded. LandbHoogesch. Wageningen, 1951, 50: 135-9, bibl. 6, illus.

A hydroxyquinoline pretreatment method for studying somatic chromosomes is described. Illustrations are

given of the chromosomes of *Allium cepa*, *Solanum tuberosum*, and *Lactuca sativa*.

1191. CAVANILLAS, L.

Experiencias en lisímetros. (Experiments in lysimeters.) [English summary 6 lines.]

Bol. Inst. Invest. agron. Madrid, 1951, 11: 24: 211-21, bibl. 6.

The calculation of water requirements of irrigated crops based on the determination of evaporation and transpiration in lysimeters may be very erroneous if the methods are not carefully chosen and the results judiciously interpreted. Norms are given for the elimination or reduction of errors produced as the result of the special conditions in which plants grow in lysimeters. Among plants mentioned are potatoes and tomatoes.

Noted.

1192.

a BRITISH STANDARDS INSTITUTION.

Timber. Dutch lights [British Standard 1612: 1950].

[Publ.] *Brit. Standards Instn.*, 24/28 Victoria Street, London, S.W.1, pp. 15, illus., 2s.

Full details of what is necessary to achieve standard.

b CORNFIELD, A. H., AND POLLARD, A. G.

The volumetric semi-micro determination of magnesium in plant and soil extracts.

J. Sci. Food Agric., 1951, 2: 371-3, bibl. 5.

c DOORENBOS, J.

Nederlandse tijdschriften op tuinbouwgebied. (Dutch horticultural periodicals.)

Meded. Dir. Tuinb., 1951, 14: 372-85.

d FINNEGAN, P. H.

Plant mounting in plastic.

Agron. J., 1951, 43: 618-19, illus.

For another account of the method, see *H.A.*, 22: 94.

e FREELAND, R. O.

The green pigment and physiology of guard cells.

Science, 1951, 114: 94-5, bibl. 4.

[See also *H.A.*, 21: 2230.]

f GERMAN, F., AND BOWEN, V. T.

A technique for growing plants under sterile conditions.

Plant Physiol., 1951, 26: 840-2, bibl. 4, illus.

g GODFREY, P. R., PARKER, H. E., AND

QUACKENBUSH, F. W.

Polarographic determination of iodine in water, soil, and plant material.

Analyt. Chem., 1951, 23: 1850-3, bibl. 7.

h HANNOVER.

Hochschule für Gartenbau u. Landeskultur Hannover, Vorlesungsverzeichnis Wintersemester 1951/52. (Curriculum of the Hanover Agricultural College Winter 1951/52),

pp. 32.

Horticulture would appear to hold an important position.

- HANSCH, C., MUIR, R. M., AND METZENBERG, R. L., Jr.
Further evidence for a chemical reaction between plant growth-regulators and a plant substrate.
Plant Physiol., 1951, 26: 812-21, bibl. 26.
- j HEWITT, E. J.
Foliar diagnosis and plant nutrient requirements.
World Crops, 1950, 2: 455-9, bibl. 12, illus.
A review and discussion of methods.
- k HIGGONS, D. J.
A rapid colorimetric method for the determination of boron, with its application to soils and crops.
J. Sci. Food Agric., 1951, 2: 498-503, bibl. 10.
- l KATHREIN, H. R.
A technique for the cultivation of higher plants under sterile conditions.
Plant Physiol., 1951, 26: 843-7, bibl. 6, illus.
- m LARSEN, P.
Enzymatic conversion of indole acetaldehyde and naphthalene acetaldehyde [in plant material] to auxins.
Plant Physiol., 1951, 26: 697-707, bibl. 17.
- n MENZEL, R. G., AND JACKSON, M. L.
Determination of copper and zinc in soils or plants. Polarographic determination in the same solution.
Analyt. Chem., 1951, 23: 1861-3, bibl. 10.
- o PILLSBURY, A. F.
Concrete pipe irrigation.
Calif. Agric., 1951, 5: 8: 3, 12, illus.
- p SÄNGER, R.
Versuche zur Beeinflussung des Wetters in den U.S.A. (Weather modification trials in the U.S.A.)
Landw. Jb. Schweiz., 1951, 65: 387-416, bibl. 18.
- q SENN, H. A.
A bibliography of Canadian plant geography. IX. The period 1941-1945 (Nos. 4385-5402).
Publ. Canada Dep. Agric. 863, 1951, pp. 183.
- r SHEPPARD, C. W.
New developments in potassium and cell physiology: 1940-50.
Science, 1951, 114: 85-91, bibl. 96.
Mainly, but not entirely, on animal tissues.
- s TORREY, J. G.
Cambial formation in isolated pea roots following decapitation.
Amer. J. Bot., 1951, 38: 596-604, bibl. 24, illus.
- t VELDSTRA, H.
On the relation structure/activity with plant growth regulators.
Reprinted from *Proc. 2nd int. Congr. Crop Prot.*, 1949, London, 1951, pp. 20, illus.
- u WALLACE, T.
Fertilising with trace elements. [French summary $\frac{1}{2}$ p.]
21ème Congr. mond. Engrais chim., Rome, 1951, pp. 12, bibl. 58.
- v WALTER, H.
Über die Assimilation und Atmung der Pflanzen im Winter bei tiefen Temperaturen. (Photosynthesis and respiration of plants in winter at low temperatures.)
Ber. dtsh. bot. Ges., 1949, 62: 47-50 [received 1951].
Observations on evergreen ornamentals.
- w VAN ZEIST, W.
Groeistofbepalingen bij hogere planten. (Growth substance measurements in higher plants.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 425-39, bibl. 31.
A review of the literature.

TREE FRUITS, DECIDUOUS.

General.

(See also 1129, 1771, 1987, 1991-1993, 1995, 2001, 2003, 2005, 2010, 2016-2018, 2025.)

1193. KEMP, W. S.
Culture of peaches and nectarines.
N.Z. J. Agric., 1951, 83: 261-9, illus.

An account of cultural operations with recommended varieties listed in order of their approximate harvesting periods in New Zealand—from early January to late March for nectarines and from early December to mid-April for peaches.

Breeding and varieties.

(See also 1132, 1264c, h, l, 2009.)

1194. TAYLOR, H. V.
Fruit varieties and production in Masters' times contrasted with modern kinds and methods.
J. roy. hort. Soc., 1951, 76: 384-91, 429-37, illus.

In the first part of this Masters' Memorial Lecture the varieties of strawberry and apple commonly grown in the Victorian era are compared with those of to-day, and the changing standards of quality and flavour are discussed. The "pine" flavour of strawberries so highly prized 50 years ago has now disappeared, and dessert apples are no longer chosen for their compatibility with port wine. In the second part the lecturer traces the change of emphasis in fruit production from deep cultivation and dunging to the selection of plant material and the abundant use of chemicals.

1195. GRANHALL, I., AND OLDÉN, E. J.
De tetraploida äpplenas utnyttjande i växtförädlingsarbetet. (The utilization of tetraploids in the breeding of triploid apples.) [English summary $1\frac{1}{2}$ p.]
Sver. pomol. Fören. Årsskr., 1951, 52: 47-65, bibl. 37, illus.

(1) At Balsgård the total number of tetraploid apple seedlings over 4 years old is now 176; several hundred

younger tetraploid plants are also being grown. (2) The apple variety Hiberna seems to exist in two forms, one triploid and one tetraploid. Both types carried fruits at Balsgård in 1951, but no differences in shape or size were observed. (3) A study of the cold resistance of twigs from 40 tetraploid forms revealed a very wide variation. Polyploidy *per se* does not decide resistance, which depends on the combination of parental genes. (4) Most tetraploids have very big fruits (400-700 g.), but "normal" size (about 100 g.) was also noted in a few cases. (5) The self-fertility of the Belle de Boskoop tetraploids is fairly high (about 10% fruit setting, and 5 seeds per fruit from selfing). Crosses between tetraploids of the same or of different origin also gave good results (about 20% fruit and 5 seeds per fruit). (6) The German variety Boiken Giant has proved triploid. (7) Crosses between diploids and tetraploids according to Nilsson-Ehle's scheme have been carried out on a big scale since 1944, when the tetraploids bloomed freely for the first time. With a very few exceptions all seedlings investigated from these crosses are triploids. (8) About 3,000 triploid plants from crosses diploid \times tetraploid are being grown at Balsgård, and the first 43 of them set fruit in 1951. (9) In crosses triploid \times tetraploid \times pentaploids (85 chromosomes) were found. The distribution of the chromosome numbers in 225 plants from these crosses seems to support the theory of the basic number 7 in apples. [From authors' summary.]

1196. RJABOV, I. N.

Breeding experiments with stone fruits.
[Russian.]

Sad i Ogorod, 1951, No. 11, pp. 22-8, illus.

An account is given of breeding experiments at the Nikitsk botanical garden to obtain new varieties of stone fruits suitable for cultivation in southern U.S.S.R. for dessert and for processing. Some of the varieties raised have been tested in the Crimea, in northern Caucasia, and in other southern regions. Cultural data for a number of the new varieties are tabulated.

1197. GROSJEAN, J.

Kruisingsproeven bij pruimen. (Hybridization experiments with plums.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1951, 14: 744-52, bibl. 9, illus.

Crosses were made between known plum varieties and wild *Prunus* species resistant to silver leaf. The technique employed includes emasculating flowers by removing both stamens and perianth, and enveloping the emasculated and pollinated flowers in cellophane cylinders. In the early stages the seedlings were grown under aseptic conditions as embryo-cultures in test tubes. In these preliminary trials there is evidence that certain 4-year-old seedlings have greater resistance to silver leaf than the plum variety which served as parent.

1198. JUNE, R. I.

Origin of red strains of apples in Hawkes Bay.

N.Z. J. Agric., 1951, 83: 438, illus.

Red strains of Dougherty, Jonathan, and Delicious apples have been produced in the Hawkes Bay district. Brief references to their origin are made.

1199. DERMINE, E., AND LIARD, O.

Étude sur la Reine Claude d'Althain. (A study of the Reine Claude d'Althain gage.)
Fruit belge, 1952, 20: 1-5, 22-8, bibl. 12, illus.

In Belgium there are two varieties of gage grown under the name Reine Claude d'Althain. The author considers that the one known as Reine Claude Conducta is the true Reine Claude which is a good variety with fruit that sells well, and that the variety usually known as Reine Claude d'Althain is not the true variety of that name. The characters of the two varieties are carefully compared and the differences indicated.

1200. LIGUE POMOLOGIQUE POUR LA DÉFENSE DU FRUIT BELGE.

Enquête fruitière 1949 sur les variétés de pruniers dans la Province de Liège. Rapport de la commission. (A critical survey of plum varieties in the province of Liège [Belgium] in 1949. Report of the commission.)

[Publ.] *Ligue pomol. Défense Fruit belge*, [undated], pp. 24, illus.

Since the 1935 survey of plum varieties in Liège [see *H.A.*, 6: 648] new varieties have been introduced and economic conditions have changed. This 1949 survey is based on the earlier one in that only those varieties previously recommended as good were studied, together with new introductions. The present list of recommended varieties contains 10 previously recommended and 4 newly introduced ones. Pomological descriptions are given of each.

1201. BALDINI, E.

Osservazioni sulla ereditarietà di alcuni caratteri del pesco. (Notes on some inherited characters in the peach.) [English summary $\frac{1}{2}$ p.]

Ann. Sper. agrar., 1951, 5: 879-93, bibl. 17.

The observations concern flesh colour and fruit surface, the reniform foliar glands and flowering and ripening time. No correlation would appear to exist between flowering and ripening times.

Propagation and rootstocks.

(See also 1229, 1239, 1240.)

1202. LUCKWILL, L. C.

Growth-inhibiting and growth-promoting substances in relation to the dormancy and after-ripening of apple seeds.

J. hort. Sci., 1952, 27: 53-67, bibl. 10.

The tests described show that the outer layers of freshly harvested apple seed contain relatively high concentrations of a growth-inhibiting substance, which disappears from all parts of the seed during after-ripening under moist conditions at 4° C. The time taken for its disappearance was also the time required to break the dormancy of the seeds under these conditions, viz. 68 days. In seeds stored dry at room temperature the inhibitor disappeared from the endosperm and embryo, but not from the testa; such seeds remained dormant indefinitely. Growth-promoting substances appeared in the embryos of after-ripened seeds just before germination started, but not in embryos of seeds in dry storage. Dormancy of apple

seeds could not be broken by chemical treatment. It is concluded that the formation of growth-promoting substances, rather than the disappearance of growth-inhibiting substances, may be necessary to break the dormancy of the seed.—Long Ashton Research Station, Bristol.

1203. WOODHEAD, C. E.

Budding of pip and stone fruit trees.

N.Z. J. Agric., 1951, **83**: 279-82, illus.

This account of methods includes a tabulated list of rootstock varieties with recommendations and notes on methods of propagation.

1204. FLOOR, J.

Onderstammen-onderzoek. (**Rootstock research.**) [English summary 7 lines.]

Meded. Dir. Tuinb., 1951, **14**: 679-90, bibl. 15, illus.

A general survey of rootstock research is given together with an outline of the author's own research programme. Preliminary trials were successful in propagating the pear rootstock Old Home and the plum rootstock Pershore by layering. A method of rapid multiplication was developed by dry-budding on rootstocks followed by layering the following year.

1205. FLOOR, J.

De vermeerdering van onderstammen voor fruitgewassen. (**Propagation of fruit tree rootstocks.**) [English summary $\frac{1}{2}$ p.]

Meded. Inst. Vered. Tuinbouwgew. **25**, 1951, pp. 14, bibl. 14, illus.

The practical possibilities of propagation by stem cuttings, root cuttings and layering of apple, plum, cherry and pear rootstocks were investigated. The effect of various factors on the rooting of stem cuttings is reviewed, and it is shown that the effect of growth substance treatment depends largely on the source of the material and on the nature of the rooting medium. Light, moisture-retaining soils appeared to be very suitable for propagation by both cuttings and layering. A high percentage of rooting was obtained from root cuttings of Crab C apple stocks and F12/1 cherry stocks planted in the open with $\frac{1}{2}$ cm. of the cutting above ground, provided shade was given in the early stages. Better rooting of layers of Old Home pear and walnut was obtained by ringing the layered shoots at the base and treating the wound with 4 mg. indolebutyric acid per 1 c.c. 50% alcohol at the end of June before the final earthing up.

1206. HATCHER, E. S. J.

The use and effect of plant growth regulators in rootstock propagation.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 188-92, bibl. 14.

A review discussing the development of research in rootstock propagation, factors influencing rooting response, and growth-regulating substances used in experiments at East Malling.

1207. CLARKE, W. S., Jr.

Apple trees on their own roots ?

Science for the farmer, Dec. 1951, pp. 8-9, illus., being *Suppl. 64th A.R. Pa agric. Exp. Stat.* **1**.

Fifteen years ago a collection of grafted apple trees was planted at Pennsylvania State College with the graft union below ground. They were allowed to scion root and the seedling rootstock was then cut off. Observations were made on their growth and yield compared with those of grafted trees. Trees of McIntosh, Keatosh, Mitton and Stayman have all done well. The root systems of Delicious and Red Rome were weak, while Jonathan, Gravenstein and Northern Spy trees did only moderately well. The yield data, tabulated here, could not be treated statistically.

1208. WOODHEAD, C. E.

Scion rooting in Gravenstein nurse grafts.

N.Z. J. Sci. Tech. Sec. A, 1950 [issued 1951], **31**: 6: 47-50, bibl. 1, illus.

Two years were required to secure a high percentage of rooted scions in Gravenstein nurse grafts on Northern Spy and East Malling No. IX rootstocks. Scion rooting was more frequent in grafts on the vigorous Northern Spy than on the dwarfing No. IX. Inversion of piece root increased the percentage of rooted scions on No. IX but this was associated with high mortality. Wired grafts excepted, scion roots in almost all grafts were confined to the region of graft union and removal of nurse roots would have been difficult. Comparatively weak roots were formed clear of the union when scions were constricted by wiring at the end of the first year.

1209. OLDÉN, E. J.

Kan *Malus theifera* anses vara lämplig som underlag för dvärgträd av äpple ? (Is *Malus theifera* a possible rootstock for apples ?) [English summary 11 lines.]

Sver. pomol. Fören. Årsskr., 1951, **52**: 95-8, bibl. 5, illus.

The very slow growth which Cox's Orange makes on *Malus theifera* (= *M. hupehensis*) is interpreted as showing incompatibility. The species is therefore ruled out as an apple rootstock, at least for Cox's Orange.—Balsgård.

1210. STARK, P., Jr.

Hardy dwarf apple trees.

Amer. Fruit Gr., 1951, **71**: 11: 17, illus.

The raising of dwarf apple trees by a triple grafting method, incorporating a special dwarfing stem piece, is described. The intermediate stem comes from a South American seedling tree named Clark dwarf stock, is completely different from any other apple wood, but is stated to be compatible with all important apple varieties. To produce the trees in the nursery a scion of the Virginia Crab is grafted to a French seedling, is planted deep to encourage scion rooting and is grown for a year. In the winter of the following season a bench graft is made with a piece of the Clark dwarfing stock and the desired variety, and is packed away until spring. By this time the grafts are callused and the combination graft is worked onto the Virginia Crab whip tree in the field, about 18 in. above the ground. At the end of the second summer the trees are transplanted into the orchard, about 4-6 in. deeper than they stood in the nursery. Hardiness, early bearing and very little pruning are among the advantages claimed for trees produced by this system.

1211. VAN CAUWENBERGHE, E.

Poiriers greffés sur cognassiers avec greffe intermédiaire. (Pears grafted on quinces with an intermediate graft.)
Fruit belge, 1952, 20: 33-8.

After reviewing information regarding pear varieties grafted on quince rootstocks the author discusses the use of intermediate pear stem pieces, and gives a table showing yields over a series of years (1932-1951) of four varieties—Clapp's Favourite, Précoce de Trevoux, Triomphe de Vienne, William's Bon Chrétien—on quince A rootstock with a number of pear varieties as intermediate stem pieces 6 cm. long.

1212. DAY, L. H.

Cherry rootstocks in California.
Bull. Calif. agric. Exp. Stat. 725, 1951, pp. 31, bibl. 30, illus.

This bulletin is a summary of observations and experiments on cherry rootstocks made over a period of 25 years at the California Experiment Station, Davis, and in various cherry-growing districts throughout the State. The 3 rootstocks in general use are mazzard, mahaleb and Stockton morello. Mazzard produces the largest trees and is partially resistant to armillaria root rot; mahaleb roots are the most tolerant of drought and unirrigated conditions; morello produces small trees and is useful on wet soils. Information is given on identification of the rootstocks in the orchard, characteristics of the 3 root systems, behaviour of sweet cherry varieties on the different stocks, stocks for sour, duke and ornamental cherries, sources and propagation of rootstock material, the possibility of using other species as rootstocks, and the comparative susceptibility of the 3 stocks to diseases and insect and animal pests.

Pollination.

(See also 1264j.)

1213. MEDNEKE, C. A. R.

Kunstmatige bestuiving in boomgaarden.
(Artificial pollination in orchards.)
Fruitterteelt, 1951, 41: 317-18, illus.

Successful results from hand-pollination with pollen imported into the Netherlands from America are mentioned. On the apple varieties Brabant Bellefleur, Goudreinet and Sterappel an increase in yield of 5-15% was obtained, and favourable results were also obtained on pears.

1214. VISSER, T.

Bloembiology en kruisingstechniek bij appel en peer. (Floral biology and crossing technique in apples and pears.)
Meded. Dir. Tuinb., 1951, 14: 707-26, bibl. 28, illus.

During 1948-1950 methods were tested for studying self- and cross-incompatibility, parthenocarpy, pollen germination and longevity of pollen. The spur-unit method (small spurs with 2 to 6 clusters) and the cluster-unit method were efficient and reliable for small scale experiments. Flowers from which the petals were removed had some attraction for insects but less than flowers with petals retained. The application of

lanolin to the stigmas hinders fruit set; mixing with paraffin oil had a particularly unfavourable effect.

1215. OSBORNE, D. J., and WAIN, R. L.

Experiments with growth substances for the setting of parthenocarpic pears.
Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 325-32, bibl. 4.

Considerable success has been achieved in setting parthenocarpic fruits with α -(2-naphthoxy)-propionic acid on the varieties Pitmaston Duchess and Dr. Jules Guyot [see also *H.A.*, 20: 1328 and 22: 187].

1216. BUTLER, C. G.

Beekeeping.*
Bull. Minist. Agric. Lond. 3, 8th edition, 1951, pp. 28, bibl. 10, 1s.

The aim of this bulletin is "a brief introduction" to the subject. The author gives details of a technique of bee husbandry applicable to any type of movable-comb hive. [Other relevant Ministry bulletins are No. 100, Diseases of bees, and No. 144, Beehives.]

Growth and composition.

1217. LJONES, B.

Bereær og kvileær hos aplar. Studier av avlingstala frå ein eldre Gravensteinshage. (Biennial bearing in apples.) [English summary 2 pp.]
Reprinted from *Meld. Norg. LandbrHøgsk.*, 1951, pp. 36, bibl. 10, as *Meld. Inst. Fruktdyrk. Norg. LandbrHøgsk.* 76.

The detailed crop records presented and discussed relate to a plot of 38 Gravenstein trees planted in 1911, of which 33 trees survived to 1948 when the study was concluded. The variety showed a pronounced biennial bearing habit with yields after 1915 varying in off-years from 0 to 84% and in on-years from 127.2% to 242.6% of the mean annual crop. Of 594 crops (33 trees in 18 years) 158 crops were of the order 0-20% of the mean crop and 87 crops exceeded 200%. Out of 20 on-years expected, only 12 actual on-years occurred. In an attempt to correlate meteorological data with crop records a definite, negative correlation was found to exist between rainfall during the blossoming period and yield, but other probable correlations are also noted. In 1941, an on-year, a spring frost damaged the blossom of the lower branches with the result that two on-years followed each other. Since then alternate cropping of the top and lower branches has continued on some of the trees. Fruits and leaves showed differences in chemical composition in on- and off-years. In on-years the fruits had higher fructose, sucrose and malic acid contents while the leaves had a higher nitrogen and a lower potassium content expressed as percentage of dry matter. Records from two further trials are briefly discussed, one proving the intensifying action of potassium manuring on the biennial bearing habit of Gravenstein and the other comparing Laxton's Superb with 6 other varieties in which the differences between on- and off-years are less pronounced. An experiment on the effect of blossom thinning is in progress.—The papers quoted in the bibliography are, with one exception, Norwegian.

* See also 1264k, 1480, 1986.

1218. DERMEN, H.
Tetraploid and diploid adventitious shoots from a giant sport of McIntosh apple.
J. Hered., 1951, 42: 144-9, bibl. 10, illus.
 A recent sport of McIntosh apple was found to be a chimera, the epidermis of which was diploid and all the internal tissue tetraploid. The formation of adventitious buds was induced and one of these gave rise to a wholly tetraploid shoot. This is the first time that a tetraploid variety has been obtained from a tetraploid-diploid chimera by the adventitious bud technique. An attempt is being made to obtain a tetraploid form of Winesap in the same way.

1219. DERMEN, H.
Ontogeny of tissues in stem and leaf of cytochimeral apples.
Amer. J. Bot., 1951, 38: 753-60, bibl. 21, illus.

In the apple there have been discovered two groups of naturally occurring diplo-tetraploid chimeras: (1) 2-4-2 chimera group with stem epidermis diploid, hypodermal tissue tetraploid, and cortex, stele and pith diploid; and (2) 2-2-4 group with stem epidermis and hypodermal area diploid, and cortex and other tissues tetraploid. Plants in the first group are sexually tetraploid, and in the second, diploid. Other chimeras herein reported appear to be derived forms of the two principal types. A study of the ontogeny of leaf and stem tissues is reported. Chimeras of the 2-2-4 type may readily change, and the sports may revert to diploidy. Propagation material should be taken from thick shoots, as slender shoots may be entirely diploid. In a 2-4-2 chimera plant, however, tetraploidy is very stable.—Div. Fruit Veg. Crops and Diseases, U.S.D.A., Beltsville, Md.

1220. MESSERI, A.
 Alcuni dati sulla embriologia ed embriogenesi di "*Olea europaea*" L. (Facts bearing on the embryology and embryogenesis of the olive.) [English summary 2 pp.]
Nuov. G. bot. ital., 1950, 17: 149-69, bibl. 21.

A first set of observations on the olive are here recorded. More should be forthcoming from the work, which is being continued.

1221. WATSON, J.
Zinc content of leaves and fruit spurs of apple trees.
N.Z. J. Sci. Tech. Sec. A, 1950, [issued 1951], 31: 6: 58-60, bibl. 2.

Samples of apple leaves, fruit spurs and leader growth of Gravenstein, Cox's Orange, Sturmer and Jonathan varieties showed marked differences in the zinc content of the different types of sample analysed. Leaf samples gave the lowest and spur bark samples the highest figures. With the exception of certain peculiarities associated with Gravenstein, there were no consistent differences in zinc status in the four varieties. Leaves gave the most consistent results in assessing the zinc status of the trees.

1222. AGATI, G.
 Contributo allo studio delle gemme dell'olivo. (A note on the olive bud.) [English summary 10 lines.]
Ann. Sper. agrar., 1951, 5: 847-58, bibl. 24.
 The author notes the normal presence of subsidiary buds situated above the ordinary axillary buds.

1223. CARRANTE, V., AND LOPEZ, G.
 Confronto fra la composizione degli ovuli e dei rami d'olivo. (A comparison between the composition of the ovuli and the branches of the olive tree.) [English summary 10 lines.]
Ann. Sper. agrar., 1951, 5: 1487-96, bibl. 8.

A comparison of the chemical composition of the swellings known as ovuli in olives with that of branches of the same age and from the same plant shows that there is little difference, thus indicating that the ovuli cannot be considered as storage organs and cannot be recommended as preferable to seedlings for the propagation of new trees.

Nutritional and soil problems.

1224. WATSON, J.
Mineral and nitrogen status of Dougherty apple leaves and fruit under different fertilizer treatments.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 4: 66-70, bibl. 1.

Chemical analyses of leaf and fruit samples show increases of nitrogen with applications of nitrogenous fertilizers. The omission of potash is shown by a reduction of at least 50% in the amounts found in the leaves. The omission of phosphate fertilizer is not shown very clearly by either leaf or fruit analyses but fruit analyses seem to correlate better in this respect than leaf analyses. Magnesia contents are decidedly lower where potassic fertilizers have been applied. Leaf samples are better than fruit samples for showing deficiencies of potash, magnesia and nitrogen.—Cawthron Institute, Nelson, N.Z.

1225. WALLACE, T.
Fertilising of fruit trees and berry fruits. [French summary $\frac{1}{2}$ p.]
21ème Congr. mond. Engrais chim., Rome 1951, pp. 17, bibl. 68.

This review deals with general problems of fruit nutrition, special problems of particular fruits including citrus, deciduous tree fruits and soft fruits, and manurial recommendations for particular fruits.

1226. KELLEY, V. W.
Peach fertilizers tests.
Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 140-8.

The effects of fertilizers upon tree growth, fruit bud formation and hardness, yield, time of bloom, fruit maturity and keeping quality, and cover crops are recorded.

1227. MADSON, B. A.
Winter covercrops.
Circ. Calif. agric. Ext. Serv. 174, 1951, pp. 24.

Interesting to the outsider for the notes and table

giving particulars of density of growth, soil preference, type of growth, cost of seed, time of planting and cold resistance of some 21 cover crops adapted to Californian conditions.

1228. BUTLIN, J.
Proeven met groenbemestingsgewassen in de fruitteelt in 1950. (Experiments with green manure crops in orchards.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 341-56, bibl. 7.

Green manure crops, listed, are recommended for April sowing, June sowing, and August and September sowing in Holland.

1229. KNOPPIEN, P., AND STRUYK, W.
De invloed van het bodemprofiel op de groei van enkele appelrassen. (Relation between soil profile and growth of some apple varieties.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 739-43, illus.

Heights were recorded of four varieties of apple trees on blue basin soil and on river-ridge soil. Cox's Orange Pippin showed very wide variations in growth both on E.M. II and on more vigorous rootstocks (XI and XIII). Belle de Boskoop, which is suitable for basin soils, also showed rather wide variations in growth. Jonathan on type II showed no variations in growth. Orchards on basin soils and those on river-ridge soils should be spaced differently, and the variety should be considered. Manurial treatment, soil management and cover cropping must be adapted to the prevailing soil conditions. The costs of production in orchards on basin soils are always higher than in those of similarly planted ones on good river-ridge soils.

1230. BENSON, N. R., AND VANDECAVEYE, S. C.
Soil fertility conditions in the apple orchards of north central Washington.
Bull. Wash. St. Coll. 527, 1951, pp. 19, bibl. 23, map.

It has been thought that nutrient deficiency might be responsible for the deterioration in fruit quality observed in the apple orchards of north central Washington. Extensive soil and leaf analyses, the results of which are reported here, show that except in isolated cases there is no deficiency problem in this area. The cause of poor quality appeared to be the excessive use of nitrogen fertilizers.

1231. MORITA, Y., AND YONEYAMA, K.
Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and tree growth. (2) Effects of soil moisture on the growth of apple, chestnut, and persimmon (*D. lotus* Linn.) seedlings and grape cuttings. [Japanese—English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1950, 19: 185-94, bibl. 5.

Apple, chestnut and kaki seedlings and grape cuttings were planted in 4-litre, 8 cm. deep, glazed porcelain crocks and soil moisture was regulated daily to 10, 15, 20, 30, 40 and 50% of dry weight of soil by the addition of water. Soil moisture at which definite

wilting was seen was 7.3% for apples, 9.3% for chestnut, 9.0% for kaki and 5.6% for grapes, while that which showed no increase in top growth was 15% for apples and 10% for the others. Optimum soil moisture for top growth was from 20 to 40% for grapes and from 30 to 40% for the others. At 50% top growth gradually decreased and leaf colour deteriorated. The root production of grapes was best at 20% soil moisture, but apple and kaki roots needed 30%. Chestnut roots weighed the same at 20 and 30% moisture. As the soil dried, top growth was affected more quickly than root growth. Nitrogen content of apple, chestnut and kaki leaves was highest at 20% soil moisture.

Cultural practices.

(See also 1170.)

1232. JEFFREY, C. W.
Dinitro-cresol dormant sprays for combating delayed foliation on apples, pears and prunes.
Sci. Bull. Dep. Agric. S. Afr. 325, being *Fruit Res. tech. Ser.* 32, ? 1951, pp. 24, bibl. 25.

In South Africa prolonged dormancy is a serious problem in fruit-growing areas. The chief symptoms are: (1) delayed and irregular blossoming and foliation, (2) failure of many fruit and leaf buds to open at all, (3) abscission of many fruit and leaf buds, particularly of apricots and peaches. Tests for the control of this condition, carried out in 1946-47 and 1947-48, showed that: (1) Dinitro-cresol plus mineral oil was more effective than oil alone, (2) the optimum period for applying DN-sprays was very much the same as when oil alone was used, early August being the best, (3) the best results were obtained with a wettable DNC powder used at the rate of 3 lb. per 100 gal. spray mixture, (4) DN-treated trees blossomed earlier than those receiving oil alone, (5) DNC was more stimulating to vegetative buds than to fruit buds so that foliation moved closer to full bloom, and functional leaves appeared at an earlier stage, (6) DN-treated trees grew better and produced larger yields and better fruit than oil-treated or control trees. (7) In general DN-treatments were more satisfactory than oil alone, and the more susceptible the area was to delayed foliation, the more effective the treatment.—Western Province Fruit Research Station, Stellenbosch.

1233. MITCHELL, A. E.
Chemical fruit thinning.
Amer. Fruit Gr. 1952, 72: 2: 26, 56-8, illus.

The following concentrations of NAA are recommended for thinning various apple varieties in Michigan: (1) 10 p.p.m. McIntosh, Delicious, Northern Spy, and Jonathan; (2) 15 p.p.m. Grimes, Oldenburg, Fameuse, Hubbardston, and Wagener; (3) 20 p.p.m. Baldwin, Yellow Transparent, Wealthy, and Golden Delicious.

1234. VRIJHOF, B., AND OELE, L. C.
Chemische bloemdundning op appels, peren en pruimen. (Chemical blossom thinning of some apple, pear, and plum varieties.)
Meded. Dir. Tuinb., 1951, 14: 232-49, bibl. 6.
Chemische . . . in Zeeland.
Fruitteelt, 1951, 41: 299-301, illus.

From the results of experiments described the authors conclude that at present it is not possible to advise the use of blossom thinning sprays to growers. It is clear, however, that fruit-set of pears and plums, as well as apples, can be reduced by applying sprays of dinitro-compounds or hormones. The sensitiveness of the trees may vary from farm to farm and from year to year. The authors recommend growers to carry out trials for themselves on a few trees, using 0.04 or 0.05% DNC when the trees are in full bloom.

1235. WURGLER, W.

Retard de la chute prématurée des fruits par des substances de croissance. (**Checking pre-harvest drop of fruit with growth substances.**)

Reprinted from *Trav. Chim. aliment. Hygiene*, 1951, Vol. 42, No. 3, as *Publ. Stat. fed. Ess. vitic. arboric. Lausanne* 404, pp. 12, bibl. 29.

A review of the literature and of the author's own work at Lausanne on the mechanism of pre-harvest drop and on the factors affecting it.

1236. VYVYAN, M. C.

Use of growth regulators to control the shedding of fruits.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 488-92, bibl. 13.

A comprehensive review, mainly of work carried out at East Malling.

1237. MCKENZIE, D. W.

Trials of some commercial plant-growth substances for the control of fruit-drop.

N.Z. J. Sci. Tech. Sec. A, 1950 [issued 1951], 31: 6: 40-6, bibl. 3.

Trials of four commercial preparations of synthetic growth substances for reducing pre-harvest drop in apples showed: (1) Fruit Fix was the most efficient material, but owing to its phytocidal properties was a potential danger to the growth of apple trees and other crops. (2) Clingspray, Estone, and Fruitone also gave good commercial control of fruit-drop, Clingspray being the most and Fruitone the least effective. (3) All preparations became effective in two to four days. (4) Maximum control was achieved six to eight days after application. (5) Fruit Fix controlled fruit-drop for eight weeks, duration of control in other treatments ranging from ten days to three weeks according to preparation and variety of apple. (6) In these trials an interval of two weeks between application and harvesting date proved satisfactory. Fruit Fix, because of its lasting effect, could be applied earlier than this. (7) Fruit-drop was more difficult to control on Jonathan than on Parlin's Beauty trees. [Author's summary.]

1238. ROBERTS, R. H.

A new method of pruning.

Amer. Fruit Gr, 1951, 71: 12: 17.

Large Golden Delicious apples were produced at the University of Wisconsin by cutting off every small branch in the middle. Although two-thirds of the blossom buds were thus removed, a full crop was obtained because of higher percentage of set and greater fruit size. Enough terminal blossom buds were formed in many of the trial trees to give good

crops the following off-year. Similar satisfactory results were obtained with Jonathan, Red Delicious, Transparent and Wealthy, but McIntosh is unsuitable for this type of pruning.

1239. JOHANSSON, E., AND BERGELIN, E.

Försök med spindelträd av äpple och päron vid Alnarp och i Fjellie 1940-50. (**Trials with apple and pear spindle bushes at Alnarp and at Fjellie 1940-50.**) [English summary $\frac{3}{4}$ p.]

Sver. pomol. Fören. Årsskr., 1951, 52: 99-109, bibl. 4, illus.

In a trial at Alnarp involving about 85 apple and pear trees of 5 varieties normal pruning was compared with the spindle bush method of training. Data are tabulated on growth of tree, yield, mean weight per fruit, and fruit drop. In another trial on a private farm a comparison was made between 68 Cox's Orange spindle bushes on EM IX and the same number of normally pruned trees of the same variety-rootstock combination. The results of both experiments show that, except for the weakly growing apple variety Yellow Richard, the spindle bush method of training is unsuitable for Swedish conditions.

1240. ROLIN, P.

Les haies fruitières en cordons verticaux. (**Fruit tree hedges formed by vertical cordons.**)

Fruit belge, 1952, 20: 17-22; 38-40, illus.

The vertical training and the pruning of apple and pear tree cordons in order to form fruit-tree hedges are described. Suitable rootstocks in relation to scion varieties are mentioned.

1241. PODGAJEVSKAJA, A. A.

Pruning sour cherries. [Russian.]

Sad i Ogorod, 1951, No. 12, pp. 24-6, illus.

This is a discussion on the pruning of the sour cherry variety Ljubskaja with data on the length of young shoots, increase of stem thickness, diameter of crown, and yield, and on the percentage of flower buds on the young shoots, in relation to different degrees of pruning.

Composition of fruits.

(See also 1266.)

1242. STRACHAN, C. C., AND OTHERS.

Chemical composition and nutritive value of British Columbia tree fruits.

Publ. Canada Dep. Agric. 862, 1951, pp. 86, bibl. 171, illus.

Many hundreds of analyses were made, over a 5-year period, of the more important varieties of apples, apricots, cherries, peaches, pears, plums and prunes grown in the Okanagan and adjacent valleys. The figures are discussed. In general the investigation showed British Columbia tree fruits to compare very favourably with similar fruits grown elsewhere. The samples examined were taken from commercial packages, hence the data indicate the composition of fruits as they normally reach the consumer. Mention is made of the direction in which future research into

the nutritive, physiological and therapeutic properties of fruit might proceed.

1243. AYRES, A., AND FALLOWS, P.

The chemical composition of some English market apples and their juices.

J. Sci. Food Agric., 1951, 2: 488-96, bibl. 11.

Analyses carried out on a number of freshly harvested samples of apple juice over a period of 5 years, show that the chemical composition of such juices may vary within wide limits. The values found depended not only on the variety of fruit but also on source and seasonal conditions. An extensive list of the ascorbic acid contents of whole apples from the best-known English market varieties is given.

1244. AUBERT, P.

Qualité et conservation de pommes d'une même variété mais provenant de vergers divers et cultivés dans des conditions naturelles différentes. (The eating and keeping quality of apples of the same variety grown in different orchards and under different environmental conditions.)

Rev. romande Agric. Vitic., 1951, 7: 51-4.

The varieties Belle de Boskoop, Reinette du Canada and Ontario were used in these trials carried out by the Montagibert Experiment Station, Lausanne, from 1944 to 1950. Fruit was taken from 10 orchards with different conditions of soil and climate, and was stored until fully mature. Observations were then made on the quality. It is concluded that Belle de Boskoop gives the best results when grown at an altitude of 500-600 m., that excessive exposure to sun increases the incidence of oidium but that fruit grown in shady conditions is not of the best quality or appearance. Reinette du Canada is not adversely affected by strong sunlight; on heavy soils the fruit is of good quality but rather green, while on gravel soils and with sunny conditions the fruit is of a clear yellow colour and remarkably high quality. Ontario acquires an excellent quality in very hot districts; when grown at high altitudes the size and colour of the fruit is comparable to that grown on the plains but the flesh quality is inferior; the colour is best on light soils.

Harvesting, marketing and storing.

(See also 1264c.)

1245. AUBERT, P.

Essais de conservation de fruits de grosseurs différentes. (Storage trials with fruit of different sizes.)

Rev. romande Agric. Vitic., 1951, 7: 69-70.

The results of trials carried out during 1944-50 at the Montagibert Experiment Station, Lausanne, to compare the storage qualities of large, medium and small apples are tabulated and discussed. The varieties Reinette du Canada, Belle de Boskoop and Ontario were used. It is concluded that, in general, the medium-sized fruit stored the best. Large fruits, although usually of good quality, were more susceptible to rot infection and internal browning, while small fruits were usually of poor quality and were very subject to scald.

1246. FISHER, D. V., AND PORRITT, S. W.

Apple harvesting and storage in British Columbia.

Publ. Canada Dep. Agric. 724, revised 1951, pp. 47, bibl. 61, illus.

The information for this bulletin has been obtained mainly from trials conducted by the Summerland Experimental Station during the past 25 years and is presented in 5 sections. The first two deal with those cultural and harvesting practices which tend to produce high quality fruit of good keeping characteristics. The third and fifth discuss practical storage problems, and in the fourth storage disorders are described and illustrated. Summaries are included to indicate briefly the causes and methods of controlling these disorders and the harvesting and storage practices recommended.

1247. DULLUM, N., AND RASMUSSEN, P. M.

Forsøg med opbevaring af æbler 1940-1948. (Apple storage trials 1940-1948.) [English summary 5½ pp.]

Tidsskr. Planteavl., 1951, 54: 249-317, illus., being *Beretn. Stat. Forsøgsvirks. Plankult.* 438.

The trials reported in this bulletin were carried out at the State Experiment Station, Blangstedgaard, Denmark, with the more important Danish apple varieties, including Belle de Boskoop, Bramley's Seedling, Beauty of Kent, Cox's Orange, Cox's Pomona, Gravenstein, Jonathan and Laxton's Superb (only one series). The apples were kept (A) in four different types of store: (1) ventilated store without refrigeration, (2) refrigerated store (2-5° C.), (3) ordinary gas store (9% CO₂, 12% O₂, 4° C.), and (4) special gas store (5% CO₂, 2-3% O₂, 4° C.); and they were submitted (B) to four different temperatures: (1) no refrigeration, (2) 5° C., (3) 2-5° C. and (4) 0-5° C. Bramley's Seedling and Laxton's Superb had a storage life of 6 months and Jonathan of 8 months in ordinary gas storage, while Cox's Orange, Belle de Boskoop and Cox's Pomona kept best in refrigerated storage (4, 5½ and 6 months respectively). By placing them, however, in special gas storage (treatment A4) first and in refrigerated storage afterwards their storage life could be extended by half a month to a month. Of the different temperatures tested 2-5° C. proved the most suitable for the majority of the varieties. In another line of investigation, involving 4 varieties, cooling down for 3 weeks at 5° C. was compared with immediate cold storage. Gradual cooling was found to reduce the risk of low temperature breakdown but to favour scald, fungus rots and shrivelling. With varieties particularly susceptible to low temperature breakdown, as for instance Cox's Orange, a gradually increased refrigeration was shown to be preferable, while other varieties responded unfavourably to this treatment. Lowering or raising the temperature after placing in cold store proper always proved inferior to the preservation of a constant moderate temperature. Tables indicate the effect on all the varieties tested of all the treatments applied on storage life, scald, Jonathan spot, low temperature breakdown, brown heart, shrivelling and the development of fungus rots. [A key to the tables for English-speaking readers is provided.]

248. ULRICH, R.
Observations sur quelques accidents de l'entreposage frigorifique des fruits. (**Observations on certain mishaps in the cold storage of fruit.**)
Fruits d'Outre Mer, 1951, 6: 313-20, bibl. 2, illus.
- troubles experienced at the Station du Froid at ellevue in the cold storage of fruits, particularly apples and pears, are discussed under the following heads: *Incomplete maturity*. Examples are given of varieties which remained green, failed to become soft or did not develop proper flavour. *Disturbances during maturation*. Two types of browning are discussed, types of purely superficial origin, and internal browning associated with internal breakdown, brown heart or deep-seated browning accompanied by softening and fermentation. Other disorders in this category are the production of off-flavours and the bursting of fruits. *Other troubles*. These include excessively rapid maturation, the development of fungi and the presence of insects or mites.
249. BOVAY, E.
Quelques résultats de nos essais de conservation de poires dans une atmosphère enrichie en gaz carbonique. (**Some results of storage trials with pears in an atmosphere high in carbon dioxide.**)
Rev. romande Agric. Vitic., 1951, 7: 60-2.
- trials carried out during 1946-50 at the Montagibert Experiment Station, Lausanne, several varieties of pear were stored in atmospheres containing different proportions of carbon dioxide and oxygen. The results indicated that Passe Crassane and Winter Nelis would keep perfectly until April or May in an atmosphere of 10% CO₂: 10% O₂: 80% N₂ at a temperature of 0° C. and a relative humidity of 85-90%. Doyenné d'Hiver and Beurré Diehl required different conditions from those tested.
1250. CLAYPOOL, L. L., AND ALLEN, F. W.
The influence of temperature and oxygen level on the respiration and ripening of Wickson plums.
Hilgardia, 1951, 21: 129-60, bibl. 12.
- Wickson plums were stored in 1948 and 1949 at 10 oxygen levels ranging from about 1% to 100% at each of 9 temperatures ranging from 32° to 95° F. Among general observations made are the following: Ripening and respiration rates were accelerated in fruit held at oxygen levels above that of air. At levels below that in air ripening was delayed, especially at the 1% oxygen level. CO₂ production was reduced at temperatures of 32°, 37° and 42° F., but at higher temperatures the fruits in the lowest oxygen levels began to produce as much or more CO₂ than fruits in oxygen levels next above them, until at 77° F. the 10% oxygen lot was surpassed in CO₂ production by fruits in all three lower oxygen levels in reverse order to that normally found. These and other phenomena are discussed.
1251. ANDER, S. E.
Köldärlagring av frukt. (**Cold air storage of fruit.**)
Sver. pomol. Fören. Årsskr., 1951, 52: 145-52, illus.
- Ventilated storage, a system which relies on the surrounding air to maintain a fairly even, low temperature inside the building, is described and some data relating to apples are quoted from the first few stores of that type erected in Sweden in 1949 and 1950. In official trials, for instance, it was found that the loss of extra-fancy grade apples amounted to 22% in ventilated store, as against 26% in refrigerated store and the combined loss of weight from respiration and evaporation to 5.4% as against 6.9% respectively. Cold air storage appears to be suitable for apples, cabbage, carrots, beetroot, turnips, onions, potatoes and possibly also for pears during the autumn months.
1252. MUGGE, J., AND VAN DE PLASSE, J. B.
Automatische bediening van fruitbewaarplaatsen met geforceerde buitenluchtcooling. (**Automatic control of forced air circulation in fruit-stores.**) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 753-7, illus.
- An apparatus for automatic control of forced air circulation in fruit stores is described. The inlet and outlet of air is automatically regulated by aluminium valves. A diagram of the apparatus shows its construction.
1253. KANAEV, A. F., AND ČEKOTILLO, A. M.
Ice isothermic stores. [Russian.]
Sad i Ogorod, 1951, No. 11, pp. 55-9, illus.
- Ice storage chambers for fruit and vegetables are described. A framework is first prepared and, in winter, this is sprayed from the nearest source of water (lake, river, pond). As the water freezes the ice produced forms a vaulted cold storehouse. Two types are described and illustrated, one with a central corridor and side chambers, the other of a tunnel form. Favourable results obtained with vegetables are tabulated.
1254. BROWN, R. R.
Facts about fruit and vegetable marketing.
Times Survey of British Agriculture, Dec. 1951, p. 16.
- Brief notes on how the present markets in England and Scotland fit in to the supply and distribution of British grown fruit and vegetables.
1255. PETERSON, G. M., AND CARLETON, W. M.
Possibilities of using colored lights for detection of cull cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1951, 34: 175-81, illus.
- Pink fluorescent lights with a red filter attached appeared to be the most successful type of lighting over sorting belts in processing plants. Blue fluorescent lighting also increased the efficiency of the sorters, but was found unsuitable for daytime use. The background colour, i.e. the colour of belts, was found important in emphasizing defects.
1256. GODWIN, M. R.
Consumer packaging as a method of retailing fruits and vegetables produced in the North-east. Part I. Consumer acceptance and retailing losses.
Bull. Cornell agric. Exp. Stat. 870, 1951, pp. 35, illus.
- Results of studies conducted in the summer of 1947

at Syracuse, N.Y., indicate that a substantial majority of the consumers did not prefer prepacked fresh fruits and vegetables. It was also found that during the summer months losses of packed products were somewhat higher than those of the same items handled in bulk.

1257. BANTA, E. S.
Shifts in Eastern [apple] packing techniques.

Amer. Fruit Gr., 1951, 71: 8: 10-11, illus.

A survey of packing houses shows that the bushel basket is slowly giving way to wooden and corrugated boxes.

1258. MORRISON, W. W.
Preparing peaches for market.
Fmrs' Bull. U.S. Dep. Agric. 1702, revised 1951, pp. 23, bibl. 2, illus.

The methods of harvesting, packing, inspecting, shipping, storing and selling peaches practised in the chief production areas of the United States are described and discussed. The modern trend towards the use of a wider range of varieties is noted.

1259. TINDALE, G. B.
Apricots and peaches—new handling methods will aid industry.
J. Dep. Agric. Vict., 1951, 49: 575-80, illus.

It is suggested that, by the adoption of certain handling techniques involving cool storage and temperature control, Mildura and adjacent irrigated districts in northern Victoria could become most important centres for the production of stone fruits, particularly for the Melbourne markets. Advice is here given on the marketing of stone fruits in the fresh state, the disposal of apricots, peaches and pears for canning, and the marketing of stone fruits in the dried state. The Mildura district is now splendidly equipped with dehydrating plants for drying grapes. These plants are idle at the time of the year when stone fruits mature, and it is suggested that combined ripening and cooling chambers could be erected in conjunction with the dehydrators, the ripened fruit being drawn on from the cool chamber for dehydration over a period of 3-4 weeks, i.e. the storage life of the ripe fruit.

1260. NAVELLIER, E.
L'industrialisation totale d'un fruit méditerranéen: l'abricot. (The complete industrialization of a Mediterranean fruit: the apricot.)
Fruits d'Outre Mer, 1951, 6: 338-43, 377-80, 483-4, illus.

The numerous methods of processing apricot fruits and kernels and the uses to which its wood is put are described.

1261. BORBOLLA Y ALCALÁ, J. M. R. DE LA, AND GÓMEZ HERRERA, C.
Préparation des olives de table. (Preparation of table olives.)
Oléagineux, 1951, 6: 637-44, bibl. 9, illus.

An account is given of the preparation of table olives in Spain based on the experience of the authors at the Instituto Especial de la Grasa y sus Derivados at Seville. The main factors responsible for quality in

table olives are the variety used, the condition of the fruit, the lye treatment, the brine treatment, the capacity of the containers used and the rate of fermentation. Although all varieties of olive could be used, the produce obtained from each would have distinct characteristics, and in practice in Spain only the varieties Gordal, Manzanilla, Morona, Rapasaya and Ojiblanca are used for the purpose. Only the first two, however, are of real importance as furnishing products of the highest quality. The condition of the fruit depends on many factors, such as climatic conditions, cultural treatments, stage of maturity, yield, and transport. These are discussed briefly and it is pointed out that marked differences may occur in the suitability of the olives obtained in a single small district. There is an obvious need for research in certain directions, for example into the important question of maturity. The stages of processing are each described in detail, and experiences, together with experimental results obtained, in Spain, California and Argentina are discussed and compared.

1262. MORT, C. H.
Olive pickling.
Agric. Gaz. N.S.W., 1951, 62: 462-6, 472, illus.

In recent years the olive has been planted in New South Wales to provide fruit for pickling. The processing methods are described. Varieties which have yielded satisfactory results with the brining and sterilization process include Sevillano, Hardy's Mammoth, Cucco, Manzanillo, Verdale, Mission.

1263. PRUD'HOMME, M.
Étude de la clarification des jus de pommes japonaises. (A study on the clarification of the juices of Japanese apples.)
Fruits d'Outre Mer, 1951, 6: 141-4.

This study was carried out to determine whether the clarification processes used in France were applicable to Japanese apples. The main Japanese varieties are Kogyoku, Kokko, India, Golden Delicious, and Sterking [*sic*], and, in addition to juice clarification trials, information is given on the botanical characters, acidity, and sugars of the fruits of the first four varieties. Compared with French apple juices those of the Japanese varieties have similar sugar contents but higher acidity.

Noted.

1264.
a ANON.
Brazilië; de olijfteelt. (Olive culture in Brazil.)
Latijns Amerika, 1951, 5: 68, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 334.
b BITTING, H. W., AND BADGER, H. T.
Marketing charges for apples sold in Pittsburgh December 1949-May 1950.
Agric. Inf. Bull. 47, 1951, pp. 27.
Where the money is spent in marketing.
c BITTNER, C. S.
Fruit varieties for Pennsylvania.
Circ. Pa agric. Ext. Serv. 392, 1951, pp. 9.

- d BORGSTRÖM, G.
Äpplets industriella förädling. (The industrial utilization of apples.)
Sver. pomol. Fören. Årsskr., 1951, 52: 5-25.
Deals chiefly with developments in the U.S.A.
- e BOTTINI, E.
L'applicazione del freddo artificiale alla conservazione dei prodotti deperibili negli Stati Uniti d'America. I. La tecnica frigorifera americana e il trasporto dei prodotti ortofrutticoli. II. La refrigerazione e il congelamento dei prodotti ortofrutticoli. (The use of refrigeration for the preservation of fruits and vegetables in the U.S.A. Its organization and application.) [English summaries 6 lines and $\frac{1}{2}$ p. respectively.]
Ann. Sper. agrar., 1951, Vol. 5, No. 4, Suppl. pp. xlv-ci, illus.
- f CRASEMANN, E.
Abfallobst und Obstresten als Viehfutter. (Windfalls and fruit residue as a feeding stuff.) [French summary 13 lines.]
Gesundheit u. Wohlfahrt, Rev. suisse, d'Hygiène, 1951, 31: 355-60.
- g HEUPKE, W.
Obst und Obstsaft in der Behandlung von Krankheiten. (Fruit and fruit juices in the treatment of diseases.) [French summary 14 lines.]
Gesundheit u. Wohlfahrt, Rev. suisse, d'Hygiène, 1951, 31: 323-30.
- h JOHANSSON, E., AND LENANDER, S.-E.
Några värdefulla fruktsorter under prövning vid statens trädgårdsförsök. I. Plommon. II. Körsbär. (Some valuable fruit varieties tested in the Swedish State Horticultural Trial. I. Plums. II. Cherries.)
Sver. pomol. Fören. Årsskr., 1951, 52: 116-21, bibl. 4, illus., and 121-31, bibl. 7,
- i LENANDER, S.-E.
Körsbärsodling i Sverige. (Cherry growing in Sweden.)
Sver. pomol. Fören. Årsskr., 1951, 52: 132-44, illus.
- j MINISTRY OF AGRICULTURE.
The pollination of apples and pears.
Adv. Leaflet. Minist. Agric. Lond. 377, 1951, pp. 5.
- k MINISTRY OF AGRICULTURE, LONDON.
Diseases of bees.
Bull. Minist. Agric. Lond. 100, 2nd edition 1951, pp. 28, illus., 1s. 9d.
A companion to *Bull.* 9, Beekeeping, and 144, Beehives.
- l OLDÉN, E. J.
Växtföreläring inom stenfruktsläktet. (Stone fruit breeding.) [English summary $\frac{1}{2}$ p.]
Sver. pomol. Fören. Årsskr., 1951, 52: 66-83, bibl. 41, illus.
- m PÅHLMAN, A.
En antologi om ciderns bruk och nytta. (An anthology of cider.)
Sver. pomol. Fören. Årsskr., 1951, 52: 26-42.
With many quotations from English literature.
- n ROLLINS, H. A.
The fruit areas of America—New England.
Amer. Fruit Gr., 1951, 71: 8: 12-14, illus.
- o STEIGER, V. J.
Verwertungprobleme bei Kartoffeln und Obst, ihre volkswirtschaftliche und volksgesundheitliche Bedeutung. (The utilization of potatoes and fruit, their economic and dietetic significance.) [French summary $\frac{3}{4}$ p.]
Gesundheit u. Wohlfahrt, Rev. suisse d'Hygiène, 1951, 31: 308-22.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 1159, 1173, 1225, 1303c, d, e, g, 2003, 2018, 2031a.)

1265. CUMMINGS, M. B.
Promising bush fruits.
Amer. Fruit Gr., 1951, 71: 8: 15, 29.
A brief description of promising raspberry, blueberry and blackberry varieties recently introduced in the United States.
1266. JAKOVLIV, A. I. G., COLPE, G., AND MATERNE, E.
Composition des fruits belges. (Composition of Belgian fruits.)
Fruit belge, 1951, 19: 179-84.
Tables are given showing the chemical composition of gooseberries, black currants, strawberries, cherries, plums, and apples, according to soluble dry matter, insoluble substances, acidity, pectin, sugars and dry soluble matter after the removal of sugar.

1267. LI, H.-L.
A taxonomic review of the genus *Actinidia*.
J. Arnold Arbor., 1952, 33: 1-61.
Actinidia chinensis and *A. arguta* (known as Yang-tao in China) are known for their edible fruits [and another, *A. kolomikta*, is used for jam and wine making in the Amur forests of Siberia, see *H.A.*, 19: 929]. *A. chinensis*, *A. kolomikta* and *A. polygama* are highly ornamental plants. Here particulars are given of 36 species and 1 hybrid \times *Actinidia fairchildii*, this being a deliberate cross of *A. chinensis* by *A. arguta*.
1268. PADFIELD, C. A. S., AND BRIDGMAN, M. J.
Effect of temperature on Chinese gooseberries in cool store.
N.Z. J. Sci. Tech. Sec. A, 1950 [issued 1951], 31: 6: 61-3.
Chinese gooseberries (*Actinidia chinensis*) can be satisfactorily kept in cool store at 31-32° F. Stalks should be removed to prevent punctures in adjacent berries, and the fruit should be packed carefully to

prevent splitting. *Penicillium* rot arises mostly at punctures and splits.

1269. BOLLER, C. A.

Growing blueberries in Oregon.

Stat. Bull. Ore. agric. Exp. Stat. 499, 1951, pp. 20, bibl. 3, illus.

Blueberry growing in Oregon is still in the experimental stage, and many of the promising young plantings there are on soils very different from those which have proved to suit the crop. In this bulletin an attempt is made to apply to Oregon conditions the findings of other States. Some tentative conclusions are drawn from local observations and from experimental data obtained during the past 5 years. Environmental requirements, culture, varieties, pests and diseases and marketing are dealt with.

1270. HOARE, A. H.

The bramble fruits: raspberry, blackberry and hybrid berries.

Agriculture, Lond., 1952, 58: 537-40.

Figures for 1950 show that the small fruit acreage in England and Wales has gone up from 47,200 acres in 1939, after dropping in the war, to 51,200 acres in 1950, but that during that period raspberries, blackberries and logans have not yet regained their former positions among such fruits. In 1950 the respective acreages were raspberries 4,300 and the other two together 1,200. Virus work inspired and directed from East Malling has, however, set raspberries on the road to recovery and a strong contributory factor in this has been the Ministry's Certification Scheme. Notes are given on the origin of the blackberry and on the logan and some of the other hybrid berries such as Laxtonberry, Veitchberry, etc.

1271. KOBEL, F.

Eine eigenartige neue Himbeersorte. (A new raspberry variety.)

Schweiz. Z. Obst- u. Weinb., 1952, 61: 24-6, illus.

A brief description is given of an "everbearing" raspberry which flowers on new canes and bears fruit throughout the growing season. It originates from a seed of Lloyd George and is named after its breeder, Romy. While it requires further testing, it is already obtainable at two Swiss nurseries; it is thought particularly suitable for private gardens.

1272. JOHNSTON, S.

The Early Red raspberry.

Quart. Bull. Mich. agric. Exp. Stat., 1951, 34: 172-4, illus.

This newly introduced variety originated 10 years ago in Michigan from a cross between Lloyd George and Cuthbert. Among its chief assets are earliness, good flavour and suitability for processing. Its long fruiting season may make it popular for home gardens. No virus diseases have been found in test plantings of Early Red to date.

1273. WOOD, C. A., AND BOASE, M.

Fruit variety trials. I. A trial of ten varieties of raspberry at Forfar, Angus.

Scot. Agric., 1951-52, 31: 159-67, bibl. 4.

Crop records for the past 4 years have shown Malling Promise, M. Landmark, M. Jewel, Norfolk Giant,

M. "M" and Lloyd George to form a high yielding group, while M. Enterprise, M. Notable, St. Walfried and Newburgh have cropped at a significantly lower level. Fruit characters, seasons of ripening, cane production and growth habit, reactions to spring frosts and processing qualities of the varieties are given. The health of current stocks of most modern raspberry varieties has been summarized elsewhere [see H.A. 21: 2380].

1274. ASKEW, H. O., CHITTENDEN, E. T., AND WATSON, J.

Boron, copper, manganese and zinc in the nutrition of the Red Antwerp raspberry.

N.Z. J. Sci. Tech. Sec. A, 1951, 33: 3: 13-26, bibl. 11, illus.

At Motupiko favourable responses of the Red Antwerp raspberry to treatment with borax and copper and manganese sulphates were obtained in field trials. Zinc sulphate, in the amount used (10 lb. zinc sulphate plus 5 lb. hydrated lime per 100 gal. water) appeared to be toxic to the plants. Except for boron, the minor element content of the leaves and fruit was altered very little by the treatments applied. The experiments described suggest that in raspberry gardens where a generous liming programme has been carried out the application of copper, and possibly of manganese, may prove beneficial to the growth of the Red Antwerp variety.—Cawthron Institute, Nelson, N.Z.

1275. HENDERSON, C. W. P.

New autumn-fruiting strawberries.

Fruitgrower, 1952, No. 2924, pp. 47-9.

A grower describes his experience in the south of England with the French "large perpetual", varieties Triomphe, Sans Rivale, and Inépoussable. Picking started on 6 August and continued, with the aid of Dutch lights, till 22 November. Because of their exceptional vigour during the first year, a tentative recommendation is made for growing the plants as annuals.

1276. LJONES, B.

Plantetidsforsøk med jordbaer 1947-1950 i Ås. (Time of planting trials with strawberries 1947-50.) [English summary $\frac{1}{2}$ p.] *Forskn. Landbruk.*, 1951, 2: 215-19, bibl. 3, being *Meld. Inst. Fruktdyrk. Norg. Landbr.-Høgsk.* 18.

These trials were carried out with the strawberry varieties Abundance and Deutsch Evern to determine the best time for planting. Spring planting gave a bigger crop, both in the first year of bearing and over the whole period of the experiment, than early (20 July) or late (20 August) summer planting, and in the case of the variety Deutsch Evern it also gave the largest average berry size. Summer planting, however, made for larger fruits early in the season and for slightly earlier ripening in the first year of cropping.

1277. DELVER, P.

Bemestingsproeven met platglasaardbeien. (Fertilizer experiments with strawberries under Dutch lights.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1951, 14: 919-24, bibl. 1.

Fertilizer experiments with strawberries grown under Dutch lights on a peaty garden soil showed that heavy

dressings of half-decomposed stable manure, pig manure, and "dunne mest" (a manure having a high K-content from cattle fed with waste of gin-distilleries), of up to 80 tons per acre annually, regularly used by growers, supply the soil with uneconomically large quantities of mineral elements. Such heavy dressings of stable manure may even cause a decline in the yield.

Vines.

(See also 1129, 1231, 1771, 1996, 2017.)

1278. VIDAL, J. P.

L'expérimentation viticole à l'École d'Agriculture de Meknès. (Viticulural research at the Meknès School of Agriculture [in Morocco].)

Terre maroc., 1951, 25: 345-61.

Certain aspects of research at the Meknès School of Agriculture that have already yielded results are described and discussed in some detail. *The output of cuttings, etc., used as rootstocks*: The weight of wood, number of cuttings and number of graftable cuttings yielded over the past two years are recorded per hectare for 13 rootstock varieties. The potential yield of new plants is also tabulated, based on the recorded percentage "takes" of cuttings and grafts. Marked variation in the production of plants is shown, the most prolific, *Rupestris du Lot*, yielding 7 times as many as the least prolific. It is pointed out, however, that this variation is applicable only to conditions at Meknès and some of the stocks would almost certainly yield much better under other conditions. *Choice of rootstock*: The ease of multiplication of *Rupestris du Lot* and its consequent low price has encouraged a more widespread use of this stock than its performance justifies. Yield figures are tabulated for the varieties Carignan, Cinsaut and Alicante-Bouschet on several rootstocks. With all three varieties yields on 41 B have been 4 or 5 times those on *Rupestris du Lot*, which gave the lowest yields of any of the stocks tested. *Rupestris du Lot* has also given poor results with the varieties Grenache, Clairette and Chasselas. Another stock which has given particularly good results at Meknès is R.99. *Method of propagation*: Three methods of raising plants are compared. Root-grafting is the most expensive, and unless the nurseryman is particularly careful there is a risk of confusing stocks and scions. Budding at stake is commonly practised but the success obtained is variable, and the buds grow so vigorously in the following spring that they are often damaged by wind. Cleft grafting at stake results in less vigorous shoots than budding, but it is still necessary to stake the plants and to remove suckers from the rootstock. A recent trial that gave 96% take suggests that bench grafting is a much more satisfactory and cheaper method than either of the above. In this case the graft is made on a bench, the union tied with raffia and coated with paraffin wax and the resultant plant set direct in the field. *Defoliation, disbudding and summer pruning*: The results are tabulated of a trial in which either 3 or 5 leaves were removed from the base of the shoots of the variety Carignan grafted on 41 B either just before or just after flowering. In each case the partially defoliated vines yielded less than the controls. In a similar series of trials disbudding the surplus sucker growths in April

did not increase yields. Finally in a summer pruning trial that was too small to permit statistical analysis cutting back the shoots to 10 leaves from the base just before flowering had no effect on yield, but cutting back just after flowering produced an apparent increase in crop. *Method of training*: The relative merits are discussed of the Gobelet method in which the vines are kept low growing and cover the ground uniformly, and the Guyot method in which they form longer stems and are trained along two wires. In 1949 a marked yield difference in favour of the Guyot method was obtained with the variety Carignan on 41 B. In 1950, which was unusually dry, the difference was less marked but still present.

1279. SNYDER, E., AND HARMON, F. N.

The Cardinal, Calmeria, and Blackrose grapes for vinifera regions.

Circ. U.S. Dep. Agric. 882, 1951, pp. 8.

These new vinifera varieties are the production of the U.S. Horticultural Field Station, Fresno, Calif., where grape breeding has been in progress since 1923. The Cardinal—dark red—will, it is hoped, fill the need for an early market variety, the Calmeria—yellow—is a good quality late shipping and storage grape, and the Blackrose of average season has attractive jet-black berries and good eating quality.

1280. LEVADOUX, L., ARTOZOU, J., AND BAUDEL, J.

Notes sur l'Ondenc ou Piquepout de Moissac. (Notes on the grape vine variety Ondenc or Piquepout de Moissac.)

Progr. agric. vitic., 1952, 137: 96-105, illus.

The author concludes that vines known under these and certain other names in France are identical. The synonymy of the variety is set out with the regions in which the different names are used. The characters of the different organs are described and the cultural value of the variety is discussed.

1281. DURQUETY, M., AND BISSON, J.

Étude ampélographique des sarments de certains cépages français du Sud-Ouest. illus.

(Descriptions of the stems of certain French varieties of vine in the south-west of France.)

Progr. agric. vitic., 1952, 137: 65-73, bibl. 3.

This is a classification, based chiefly on stem colour, of 61 clonal varieties of *Vitis vinifera* grown at the Agricultural Research Centre of south-west France, on the Domaine de la Grande Ferrade.

1282. BAGGIOLINI, M.

Les stades repères dans le développement annuel de la vigne et leur utilisation pratique. (A specification of the stages in the annual development of the vine and its practical value.)

Rev. romande Agric. Vitic., 1952, 8: 1: 4-6, illus.

Ten stages in the annual development of the vine, from the dormant bud stage to fruit set, are defined and illustrated, and a table is presented showing the spray treatments to be given at each stage. It is proposed that this classification shall henceforth be used for phenological records and plant protection recommendations.

1283. STRELJNIKOV, I. G.

The influence of the laterals on the development of inflorescences in dormant buds [in vines]. [Russian.]

Vinodelie i Vinogradarstvo, 1951, No. 11, pp. 36-7, illus.

From the data presented the author concludes that the amount of nutrient materials in cuttings and buds resulting from the physiological activity of the whole plant is greater when the side shoots are not removed entirely but only pinched back to an optimal number of leaves. The actual number depends on variety and conditions of growth. The leaves of the laterals in their continued development guarantee a supplementary accumulation of nutrients, which fully compensates for the expenditure of nutrients required for the development of the laterals.

1284. PIERI, G.

Azione di alcune sostanze catalizzatrici sul germogliamento delle talee di vite. (The effect of certain catalysing substances on shoot formation in vine cuttings.)

Ann. Sper. agrar., 1951, 5: 1409-14, bibl. 3.

In this pocket experiment 5 cuttings of *Rupestris* du Lot were submitted both in sand and water culture to the presence of one of the following catalysing substances, viz. calcium fluoride, zinc sulphate, nitrate of lead, manganese sulphate, potassium bromate, copper sulphate and lithium carbonate. The sand trials were a complete failure for reasons unconnected with the purpose of the trial. Results of the water trials suggested the possibility that the first four of the substances named may have appreciably aided both budding and growth.

1285. COSMO, I.

Breve guida al riconoscimento dei principali vitigni portinnesti. (A short guide to the recognition of the chief vine rootstocks.) [English summary ½ p.]

Ann. Sper. agrar., 1951, Vol. 5, No. 6, *Suppl.* pp. lxxx-cxx+23 plates [showing leaves].

In this work the author first discusses the parts of the vines that lend themselves to profitable examination and description and the times when observations must be made. He then passes to an exact examination of those parts in particular vines, tabulating the important characteristics in many cases. He summarizes the most important general morphological characteristics of the various groups of stocks and shows how to distinguish individuals within each group. The main groups discussed are: *Riparia*, *Rupestris*, *Riparia* × *Rupestris*, *Berlandieri* × *Riparia*, *Berlandieri* × *Rupestris*, complex American hybrids, European American hybrids.

1286. GALET, P.

Classement at reconnaissance des sarments des espèces américaines et des porte-greffes. (The classification and recognition of American species of vine and of rootstocks.)

Progr. agric. vitic., 1952, 137: 8-17, illus.

After a brief introduction, this article comprises a vocabulary of the terms used by the author in his

descriptions, a key to the American species, a classification of American species, a key for the recognition of rootstock varieties, and a classification of rootstock varieties with short descriptions.

1287. GALET, P.

Les porte-greffes de Malègue. (Malègue's rootstocks.)

Progr. agric. vitic., 1952, 137: 33-48, illus.

This is an account of rootstock varieties of grape vine raised by Victor Malègue, a vine grower at Pèzilla-la Rivière (eastern Pyrenees). He raised not only bearing varieties but also a number of hybrid rootstocks and became a specialist in complex hybrids. In his breeding work he sought to unite characters from at least three species in order to obtain, in the progeny, plants widely different from the classic binary hybrids. Descriptions of a number of his hybrids are given with illustrations showing the shape of their leaves.

1288. LEYVRAZ, H.

Plantation de vignes avec des greffes encartonnées. (Planting grafted vines in cartons.)

Rev. romande Agric. Vitic., 1952, 8: 13-14, illus.

A new method of forcing vines in perforated cartons, which has recently been studied at Geisenheim, was tested during 1951 at Lausanne. The grafted, stratified vines were placed in the cartons filled with a special soil mixture on 20 May, with only the grafts projecting. They were then placed in a warm frame, surrounded with the soil mixture, and carefully forced and hardened off. After 5 weeks the plants, in what remained of the cartons, were planted out in their permanent positions. The long cartons, used to cover the high-worked stocks, are considered too expensive for commercial use, and moreover had completely rotted by the time of transplanting, with the result that the transplanting shock was great and all the vines died. The short cartons had not decomposed but only 54% of the vines survived. The method is not recommended for commercial use, but is considered worthy of further trial with short grafts.

1289. HENRIOT, —.

Essais sur le paraffinage: le greffage et le racinage en chassis chauffés. (Trials with paraffin wax: grafting and rooting in warm frames.)

Progr. agric. vitic., 1951, 136: 327-8.

A brief description is given of trials with grafted vine rootstocks, which were put in cardboard cylinders and then placed in a warm frame, some of the plants being paraffin waxed, others left untreated. Only the former gave satisfactory results.

1290. CORNU, C.

Du nouveau dans le "paraffinage" ou "greffe au trempé". (More on paraffin waxing or immersion grafting.)

Progr. agric. vitic., 1952, 137: 74-6.

"Paraffinage" is here described as plunging the union of bench-grafted vines in a bath of melted paraffin wax in order to protect the graft from desiccation and to simplify nursery operations (earthing-up, etc.). The disadvantages are discussed, and a method is suggested

of applying the paraffin wax as an emulsion which can be painted on the grafts, so that immersion can be avoided, and if necessary the grafts can be treated in the nursery.

291. SIMONOV, I. N., AND MIRONOV, E. V.
A new method of studying phosphorus nutrition in the grape vine. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 11, pp. 33-5, illus.

Radioactive phosphorus was used to indicate the distribution of this element in the grape vine. The method was to wash the root systems of young plants free from soil and then immerse them in a solution containing radioactive phosphorus for periods of from 2 to 14 days. It was found that, (1) there was a greater accumulation of radioactive P in inflorescences which had been pollinated with a pollen mixture than in those receiving one kind of pollen only, (2) the accumulation of P was greater in the roots and stems than in other organs, (3) when the terminal growing point was destroyed, there was increased concentration in the buds in the leaf axils.

1292. BUŠIN, P. M.
Microelements in the vineyards of Uzbekistan. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 12, pp. 19-22, bibl. 2.

The addition of manganese and boron to NPK fertilizer gave substantial yield increases in grapes, but that of boron alone was found less effective. While the importance of boron in the nutrition of grape vines is recognized, the method of application appears to be a major factor, and should be determined by soil conditions. Vines growing on soils containing appreciable amounts of soluble B, as is often the case in Uzbekistan, reacted to spray applications of 0.25% boric acid during flowering very favourably, setting particularly being improved.

1293. TOMKINS, J.
Balanced pruning of grapes.
Amer. Fruit Gr., 1951, 71: 12: 13, 26.

When training vines by the Four-Cane Kniffen system, the remaining 4 shoots are often cut back to 10 buds, i.e. 40 buds per vine, irrespective of vigour. The number of buds which a vine should be permitted to retain is stated to be in direct proportion to the amount of wood (prunings) which it produces. It has been established for the Concord variety that a vine from which 1 lb. of prunings are removed will adequately support 30 buds. For every additional pound of prunings 10 further buds should be retained.

1294. HUBER, H.
Der Einfluss der Höhe des Tragholzes auf Quantum und Weinqualität. (The influence of the height of wood on the quantity and quality of wine.)
Schweiz. Z. Obst- u. Weinb., 1951, 60: 237-8.

A brief note supported by data shows that both yield and quality of wine made from grapes from a Riesling × Sylvaner plot trained high, i.e. at 70 cm., are superior to those from vines trained low, i.e. at 40 or 50 cm.

1295. MARAIS, P. G.
Automatic control of SO₂ with a photo-electric cell in the long-term storage of grapes.
Sci. Bull. Dep. Agric. S. Afr. 322, 1951, pp. 10, bibl. 2, illus., being *Fruit Res. Ser.* 20.

The decoloration of a blue iodine-starch solution on reaction with SO₂, as observed with the aid of a photo-electric cell, was used to regulate automatically the gas in the atmosphere of the store. With the use of suitable chemicals, other gases can also be controlled with this apparatus. A preliminary storage experiment revealed that the SO₂ concentration within the grape can be kept constant by means of this apparatus. There is no reason why it should not be possible for grapes to be stored very successfully for six months and longer by this method. [Author's summary.]

1296. BOVAY, E.
Quelques résultats de nos essais de conservation de raisins de table. (Some results of storage trials with table grapes.)
Rev. romande Agric. Vitic., 1951, 7: 43-5.

The results are summarized of trials carried out during 1946-50 at the Montagibert Federal Experiment Station, Lausanne, on the storage of table grapes. It was found that many varieties could be stored successfully until the end of December at a temperature of 1° C. and a relative humidity of 90-95%, provided the fruit was disinfected to prevent rotting. Of several disinfectants tested the only one that did not cause injury was sulphur gas at a concentration of 15 g. sulphurous anhydride per m³. About 6 fumigations were required during the storage period and the chambers had to be ventilated 24 hours after each fumigation. Only perfect fruit could be used, as injured grapes became tainted. The results obtained with 19 varieties are tabulated. Delicate-skinned varieties did not store satisfactorily, but good results were obtained with Muscat rouge Foscati, Muscat de Hambourg, Chasselas Fendant roux, Chasselas Doré de Fontainebleau, Chasselas Rose Royal, Pirovano 185 and the hybrid P.D. Seyve-Villard 20, 347.

Nuts.

(See also 1303b, f.)

1297. BLACK, M. W., AND DU PREEZ, D.
Nut production in the Cape Province.
Fmg S. Afr., 1951, 26: 325-30, 334, bibl. 3, illus.

South Africa at present imports nuts. Some increase in walnut planting is possible but limiting factors are availability of suitable soil and water and existing crops; more effective codling moth control measures and future planting of budded/grafted varieties are essential. Small-scale planting of pecans in the warmer W. and S.W. parts of the Province is recommended either in orchards or in rows along irrigation furrows; considerable expansion is unlikely. The position of almonds is not so promising. There is great confusion with regard to nomenclature, which results in pollination difficulties. Almonds grow best, moreover, where apricots, peaches and vines are well established as paying crops. A.C.S.

1298. LODER, R. E.

Almond growing at Lockington.

J. Dep. Agric. Vict., 1951, 49: 608-9, 613, illus.

This is a plan for an extension of almond growing in Victoria, where some growers have shown that the crop can provide a good, steady income. There is little risk of losing a large proportion of the crop through disease and, if the right varieties are chosen, yields are consistent. Advice is given on pollination, rootstocks, cultivation and manuring, pest and disease control, pruning, harvesting and cracking, and marketing. In the orchard to which particular reference is made most trees are on peach stock, but some are on almond. The former will stand wetter conditions, but the trees are shorter lived. Trees grown on almond stock are usually larger than those on peach. For almonds on almond stock, a planting distance of 24 ft. \times 24 ft. is used.

1299. MATSUI, S., AND MURATA, N.

Studies on chestnut varieties suitable for making marrons glacés (glacé chestnuts).

[Japanese, English summary 36 lines.]

J. hort. Ass. Japan, 1950, 19: 161-7, bibl. 11.

Experiments in the 3 years 1947-1949 with 25 varieties of sweet chestnut showed considerable differences in the ratio of outer skin and inner peel to whole weight of nut and in moisture content. *Castanea crenata* proved more suitable for marrons glacés production than *C. mollissima*. Mature nuts should be used and they should be cooked as soon as possible after harvesting. The cracking, which is liable to occur during processing, can be prevented by tying threads round the peeled nuts before processing. [From authors' summary.]

1300. BEJERINCK, W.

Hazelnoteenteelt. (Filbert culture.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1951, 14: 513-22, bibl. 24, illus.

The origin of filbert culture, of cultivated varieties and of the present collection are briefly described and conditions of cultivation are discussed. Observations were made at the Experimental Garden at Wijster (Darenthe) from 1944 to 1950 to determine varieties and prospects in the Netherlands, and how to propagate the best varieties vegetatively on a small scale.

1301. GERRITSEN, C. J.

Walnotenteelt; economische aspecten en stand van het rassenonderzoek. (Walnut growing; economic aspects and progress of the research on varieties.) [English summary $\frac{3}{4}$ p.]

Meded. Dir. Tuinb., 1951, 14: 523-39, bibl. 9, illus.

The importance of growing selected varieties of walnuts instead of casual seedlings is emphasized. Many reputable foreign varieties are being grown at the

Horticultural Plant Breeding Institute, Wageningen, and others will be introduced to test their suitability for cultivation in the Netherlands.

1302. JACOBONI, N.

Il noce nell'Umbria. (The walnut in Umbria.)

Ann. Fac. agrar. Perugia, 1949, 6: 270-85, bibl. 18 [received 1952].

Descriptions are given of the Commune variety which forms about 80% of the walnut population in Umbria, the Premice and the Nocione. It is thought that careful selection of Commune would produce an extremely good nut population.

Noted.

1303.

a BALLATORE, J. P.

Contribution à l'étude de quelques stimulants hormonaux pour l'enracinement de boutures. (A contribution to the study of certain growth substances used for rooting cuttings.)

Fruits et Prim., 1950, 20: 305-8, bibl. in text, illus.

For abstract of Italian original, see H.A., 20: 2432.

b DANIELSSON-SANTESSON, B.

Fortsatta undersökningar av polyploid hassel. (Further studies of polyploid hazel.) [English summary 1 p.]

Sver. pomol. Fören. Årsskr., 1951, 52: 84-94, bibl. 12, illus.

c EINSET, J.

Apomixis in American polyploid blackberries.

Amer. J. Bot., 1951, 38: 768-72, bibl. 9, being J. Pap. N.Y. St. agric. Exp. Stat. 850.

d NILSSON, F.

Kommersiell bärödling. (Commercial small fruit growing [in Sweden].)

Sver. pomol. Fören. Årsskr., 1951, 52: 153-60, illus.

e OREGON STATE COLLEGE.

Strawberry plant certification standards.

[Mimeo.] Ore. St. Coll. Certif. Cttee, Corvallis, Ore., 1947, pp. 5.

f WEIR, W. C.

Almond hulls as feed.

Calif. Agric., 1951, 5: 9: 13, illus. For lambs.

g ZELLER, S. M., AND CLARK, R. R.

Plan for producing strawberry foundation planting stock.

[Mimeo.] Ext. Circ. Ore. St. Coll. 493, 1947, pp. 3.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 1999.)

1304. HASSEBRAUK, K.
Bericht über die Ergebnisse der deutschen landwirtschaftlichen Pflanzenschutzforschung 1945-1950. (Report on the results of German plant protection research 1945-1950.)
 Landwirtschaftlicher Forschungsrat e. V. Bonn, [1951], pp. 56, bibl. 556.
 A review summarizing German literature published on plant protection since the end of the war. The work is divided into 10 sections: the first relating to textbooks amounting to some 50, the rest dealing with individual aspects such as viruses, bacteria, animal pests, and control methods. The bibliography is arranged accordingly in 10 groups, thus dispensing with an index.
1305. STATENS PLANTPATOLOGISKE FORSØG.
 Plantesygdomme i Danmark 1949. (Diseases and pests of plants in Denmark 1949.)
 [English summary 21 pp.]
Tidsskr. Planteavl, 1951, 55: 1-81.
 Includes diseases and pests of fruit, vegetables and ornamentals, some of them being recorded in Denmark for the first time.
1306. MINISTERIE VAN LANDBOUW, WAGENINGEN.
 Enige ziekten en plagen in cultuurgewassen in 1950 en hun bestrijding. (Some diseases and pests of cultivated plants in 1950 and their control.)
Meded. PlZiekt. Dienst. 118, 1951, pp. 120, illus.
 This is a well illustrated account of the diseases and pests of agricultural and horticultural plants (including fruit trees and bushes) in the Netherlands, showing their intensity and distribution and with notes on control. Measures for the control of colorado beetle, and of apple and pear scab are treated at some length.
1307. DEMAREE, J. B., AND STILL, G. W.
 Control of grape diseases and insects in eastern United States.
Fmrs' Bull. U.S. Dep. Agric. 1893, 1951, pp. 36, illus.
 This publication supersedes an earlier bulletin of the same number see [H.A., 12: 865]. While no addition is made to the diseases listed originally, notes are given on 7 further pests of the vine. The recommended spray materials include the recently developed fungicide ferbam and the newer insecticides DDT and parathion. A general spray programme, for the control of both pests and diseases, consisting of 6 applications, is suggested.
1308. NANCE, N. W.
 Some new and important plant disease occurrences and developments in the United States in 1950.
Plant Dis. Repr., 1951, *Suppl.* 202, pp. 70-91.
 Diseases of fruit crops pp. 79-82, of nut crops p. 82, of ornamentals pp. 83-4, of special crops (including tobacco) pp. 84-6, and of vegetables (including tomato) pp. 88-91.

1309. HUBERT, F. P.
 Common names of diseases of woody plants.
Plant Dis. Repr., 1951, *Suppl.* 207, pp. 205-35, bibl. 26.
 As the common names of diseases here listed include those of many kinds of fruit trees they will be useful at times for reference. They are in two lists: I. Diseases listed by common names. II. Causal organisms listed by scientific names.
1310. WAHLIN, B. J. O.
 Något om moderna växtskyddsåtgärder och deras inverken på balansen i naturen. (The influence of modern pest control methods on the balance of nature.) [English summary ½ p.]
J. roy. Swedish Acad. Agric., 1951, 90: 161-75.
 The paper re-emphasizes the danger of indiscriminate insecticidal applications which destroy the predator or parasite with the insect. The damage caused by insecticides and herbicides to pollinating insects and useful soil insects is also mentioned.
1311. TOMKINS, R. G.
 The microbiological problems in the preservation of fresh fruits and vegetables.
J. Sci. Food Agric., 1951, 2: 381-6, bibl. 25.
 The general aspects of the rotting of fruit and vegetables, factors affecting the spread of micro-organisms within tissues and the infection and invasion of plant tissues are considered. Methods of reducing rotting include the destruction of sources of infection, the avoidance of mechanical injury, more cold storage facilities and certain direct control measures such as washing oranges with fungicidal solutions, wrapping pears in impregnated papers, treating wood wool in which grapes are packed with sulphite solutions, and using solid carbon dioxide as a means of cooling.
1312. ANON.
 Electronic bug chaser.
Agric. Chems., 1952, 7: 1: 59, 61, 87-9, illus.
 A light-hearted article on the control of insect pests by means of electronic treatment. The description of the apparatus, similar in appearance to some portable radios, and the explanation of its working mechanism are interjected with doubts as to the feasibility of the whole idea. Eyewitness reports give contradictory accounts of the effectiveness of the method.
1313. TAYLOR, L. R.
 An improved suction trap for insects.
Ann. appl. Biol., 1951, 38: 582-91, bibl. 3, illus.
 A suction trap for airborne insects has been previously described by Johnson (*Ann. appl. Biol.*, 37: 80-91). Certain structural improvements were advisable and these have now been incorporated. Constructional details are described and shown by diagrams, photographs are given of the trap and the design of larger traps is discussed. Aphids and lacewings were captured in good condition.—Rothamsted Experimental Station.

Nutritional disturbances.

(See also 1163-1167, 1230, 1274, 2007.)

1314. CIFERRI, R.

Qualche dato recente circa le malattie da carenza nutrizionale degli alberi fruttiferi. (A few recent observations on the deficiency diseases of fruit trees.)

Atti Ist. bot. Univ. Pavia, 1950, Ser. 5, 8: 181-203.

After a general review of the many problems involved in mineral deficiency work, the effects of different deficiencies, the susceptibility of particular fruit species, the symptoms displayed and the interaction of the different elements involved, the author deals briefly with the determination of deficiencies in the field and with practical measures for eliminating their ill effects. Among these the administration of prepared salts in protective sprays is considered promising. Another suitable for vegetables is the provision of the necessary elements with the seed at sowing. It remains for the chemists to make up appropriate doses.

1315. ILJIN, W. S.

Metabolism of plants affected with lime-induced chlorosis (calciose). I. Nitrogen metabolism.

Plant and Soil, 1951, 3: 239-56, bibl. 20.

Observations and analyses were made for 4 years on 17 species of plant in Austria near Vienna. They included apples, cherries, vines, lilac, *Robinia pseudo-acacia* and others. It was found that in spring the leaves of chlorotic plants had a considerably higher N content than those of healthy plants, viz. 5 to 15 times as much soluble N. By early summer there may be 0.5 to 1 mg. of amino N in healthy as against 3 to 7 mg. in chlorotic tissues. Healthy leaves contain 0.2 to 0.3 mg. of dry weight of amide N, while chlorotic leaves may have 10 times as much or more. Chlorotic leaves contain more soluble proteins and bases than normal leaves. Residual nitrogenous compounds are very scarce in normal foliage but may account for 40 to 65% of the soluble N in chlorotic plants. In fully developed normal foliage 94 to 96% of the total N is insoluble, whereas in chlorotic foliage only 30 to 40% of the soluble fraction may be synthesized into insoluble form. This abnormality in N content may be expected to result in physiological disturbance which will show itself in chlorosis.

1316. BIOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, VICTORIA.

Zinc deficiency in fruit trees.

J. Dep. Agric. Vict., 1951, 49: 547-9, illus.

The symptoms of zinc deficiency are described for citrus, pome fruit trees, stone fruit trees, and vines. Formulae are given for appropriate zinc sulphate sprays.

1317. SCURTI, J.

Sui deperimenti di alcuni frutteti della Valle d'Aosta per carenza di elementi necessari per il loro chimismo. (Dieback in some Val d'Aosta orchards due to mineral deficiencies.) [English summary 13 lines.]

Ann. Sper. agrar., 1951, 5: 745-61, bibl. 45, 1 coloured plate.

A study is presented of dieback in Reinette of Canada apple trees, the chief characteristic of which is necrosis of bark and cambium, red discoloration of the bark and, later, darkening of large zones of the wood throughout the tree. When the affected trees are young, they die in a few years. All attempts to produce the same symptoms in healthy trees by inoculation and grafting failed, whereas the addition of boron and zinc salts to a normal NPK fertilizer restored affected trees to a healthy condition.

1318. MULDER, D.

Stip in appels als cultuurverschijnsel. (Bitter pit in apples as a result of type of cultivation.)

Meded. Dir. Tuinb., 1951, 14: 20-7, illus.

Bitter pit is attributed to excess of nitrogen, relative shortage of phosphates due to magnesium deficiency, and unfavourable ratios of foliage to fruits resulting from a relatively small number of fruits. The disorder is considered to be a consequence of the scheme followed in breeding new varieties of apples, cultivation methods, and variations in the water supply during ripening.

1319. MULDER, D.

Problemen rond het stip in appels. (Bitter pit in apples.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1951, 14: 131-8.

Experiments in Zeeland for the control of bitter pit by spraying with borax or growth hormone have not yet given consistent results, and those obtained by van Stuijvenberg and Pouwer (*H.A.*, 21: 2425) could not be confirmed. The contradictory results are attributed to the different mineral composition of the apples in the Betuwe and the Zeeland regions. In the former with a type of soil of high phosphorus content due to high magnesium intake it is probable that bitter pit is more easily affected by borax sprays. In Zeeland the occurrence of bitter pit is probably more nearly connected with a low phosphate content due to a low magnesium intake and therefore the disorder is less easily controlled by borax sprays. Because of the higher amounts of nitrogenous fertilizer given in Zeeland and the grassing-down in the Betuwe orchards bitter pit is more severe in Zeeland.

1320. RUI, D., AND ROSTIROLA, G.

Leptoncrosi e malattie da carenza. (Leptoncrosis and deficiency diseases.)

Reprinted from *L'Inform. agrar.*, 15 Nov., 1951, pp. 3.

Attempts to transmit leptoncrosis in peaches by grafting having failed and cultural methods having succeeded in eliminating its symptoms, it is concluded that leptoncrosis is due to nutritional deficiency.

1321. PEYER, E.

Die Gelbsucht bei den Reben. (Chlorosis of vines.)

Schweiz. Z. Obst- u. Weinb., 1951, 60: 454-6, bibl. 1.

In trials at Wädenswil 5% iron sulphate spray was found to cure mild cases of chlorosis. With severe symptoms, however, more fundamental treatments, such as soil amelioration or selection of suitable rootstocks, are recommended.

Climatic factors.

(See also 1179, 1485q, 1992.)

1322. WOUDENBERG, J. P. M.

Nachtvorst en nachtvorstbestrijding in Kennemerland. (**Night frost and its control in the area of Kennemerland (North Holland.)**) [English summary 10 lines.]

Meded. Dir. Tuinb., 1951, **14**: 950-6.

A regional frost warning service for Kennemerland (N. Holland) was established in 1950 and continued its service in 1951. At some stations the minimum temperatures at a height of 10 cm. showed only slight local differences. On clear nights in 1951 comparative temperature observations were made in experimental fields under various covering materials, viz. plastic, sisal-kraft and crepe-jute; the differences were negligible. The temperature in the uncovered fields was about 2 degrees lower.

1323. VAN DEN MUIJZENBERG, E. W. B.

Nachtvorstschade op verschillende hoogtes boven de grond. (**Damage by night frost at different heights above the ground.**) *Fruiteelt*, 1951, **41**: 354.

Data, obtained on 2 May, 1935, after a night frost of -2° C. at a height of 2 m., show the percentages of flowers killed on 14 varieties of apple, at heights (1) up to 2 m., (2) 2-3 m., (3) 3-4 m. and (4) 4-5 m. The figures were higher on the north than on the south side of the trees, and they decreased with height; there was no damage at 4-5 m.

1324. ROGERS, W. S.

Protection from spring and autumn frosts by continuous water sprinkling. *Grower*, 1951, **36**: 626-8, bibl. 2.

The author discusses, with practical examples, the theory of frost protection by sprinkling, the equipment necessary, and the operation itself. He considers that it is practicable within limits, namely suitable equipment, a large water supply and plants that can stand the ice load without breaking. He notes that the amount of water theoretically needed is $\frac{1}{16}$ in. or 750 gallons an acre per hour, but that in practice, since the treated area is limited and there is always some air movement, more than this is actually necessary. Water must be applied continuously and sprinkling in the morning following a frost is useless.

1325. HANSEN, C. M.

The helicopter rotor as a means of controlling frost damage in fruit orchards. *Quart. Bull. Mich. agric. Exp. Stat.*, 1951, **34**: 182-8, illus.

A helicopter rotor was mounted and operated on a 20-ft. tower. The action of the rotor brought the warm upper air down to the orchard during still air frost. While the use of the machine for frost control purposes is still in the experimental stage, its advantages, including the replacement of about 200 open-flame heaters, are evident. When there was no warm air overhead, the combined use of the machine and properly spaced heaters was found very satisfactory.

1326. SPURLING, C. J.

Economy in orchard heating.

J. Dep. Agric. Vict., 1951, **49**: 584-6, 613, illus.

Notes are given on frost pockets and on the flow of air during frosts in various situations in an orchard, with an account of personally conducted experiments on placing heaters in strategic positions instead of distributing them evenly throughout the orchard.

1327. DUSSEL, J.

Essais de production de gaz sulfureux en vue de l'ennuage contre les gelées printanières. (**The use of ammonium sulphite gas for the production of clouds in the prevention of damage by spring frosts.**)

C.R. Acad. Agric. Fr., 1951, **37**: 562.

The author mentions a method of preventing frost damage by the use of clouds of ammonium sulphite, and describes a new, simple and cheap way of producing these clouds in the field.

1328. GIGANTE, R.

Suberosi in frutti e foglie di albicocco. (**Suberosis in apricot fruits and leaves.**) [English summary 5 lines.]

Ann. Sper. agrar., 1951, **5**: 1467-74, bibl. 6.

A disfigurement of apricot leaves and fruits characterized by circular or elliptical brown, raised areas is described. These areas are made of suberized cells formed under conditions of abnormal humidity such as long periods of drought alternating with long rainy periods.

1329. GAVIOLA, E.

Sobre provocación artificial de la lluvia, prevención del granizo y balance hídrico regional. (**The artificial stimulation of rain, the prevention of hail and the regional balance of water.**)

Cien. y Invest., 1951, **7**: 531-42, bibl. 8, illus.

The mechanism of natural rain and hail formation is explained, and work on the artificial seeding of clouds to stimulate rainfall is reviewed.

1330. CZAJA, A. T.

Pflanzenschäden durch staubförmiges Wasserglas. (**Plants injured by waterglass dust.**) *Z. Pflkrankh.*, 1951, **58**: 54-61, bibl. 3, illus.

Severe damage to herbaceous and woody plants (including apple, apricot, and rhododendron) is recorded as caused by waterglass dust from a factory manufacturing detergents. The injury is a result of the strong alkalinity of the waterglass (pH 11.5-11.7).

Viruses.

(See also 1188, 1485 l, t, u.)

1331. ATKINSON, J. D., AND ROBBINS, R. E.

Green-crinkle, a virus disease of apples.

N.Z. J. Sci. Tech. Sec. A, 1951, **33**: 58-61, bibl. 3, illus.

Green-crinkle occurs in all the main fruit districts of New Zealand. Symptoms have been seen only on fruit and it is common to find only a single branch of a

tree infected. It has caused appreciable loss in some varieties. The disease can be transmitted from infected trees to healthy scions, and from diseased buds to healthy trees. It appears to be caused by a virus which is probably identical with false-sting reported from Canada.—D.S.I.R., Auckland, N.Z.

1332. FOSCHI, S.

La "plastomania" del melo Gravenstein.
(A deformation disease of Gravenstein apple trees.)
Inform. fitopat., 1951, No. 12, pp. 7-8, illus.

A disease of Gravenstein apple trees in parts of Italy is characterized by a pronounced deformation and spiral contortion of the stems, branches, and young shoots. It is considered to be a virus and the advice is given not to propagate from diseased trees.

1333. MULDER, D.

Stenigheid in peren. (Stony pit in pear fruits.) [English summary 7 lines.]
Meded. Dir. Tuinb., 1951, 14: 357-61, bibl. 5, illus.

Stony pit in pears, though fairly common in the Netherlands, cannot be considered serious. Some varieties, when infested with stony pit, show also necrotic spots in the bark. So far as is known it is transmitted only by grafting. In the variety Précoce de Trevoux the disease is affected by weather conditions. Control measures include propagation from healthy trees only, and topworking affected trees with resistant varieties such as Williams.

1334. LINDNER, R. C., WEEKS, T. E., AND KIRKPATRICK, H. C.

Studies on a color test for stone fruit virus diseases.

Phytopathology, 1951, 41: 897-902, bibl. 6.

A study was made, mainly of cherry and peach trees, to determine which tissues would be the most sensitive and best adapted for chemical testing for the presence of virus diseases. Leaves appear to be the most suitable tissue on cherry trees, but wood also gives satisfactory readings and may be used during the dormant season. Wood is the best tissue to use when testing for the latent virus complex on peach or mahaleb. A procedure for testing wood tissue is described. The chemical test is useful in indicating the presence of virus infection in stone fruit trees. Its chief limitation lies in the fact that it is not possible to determine the identity of the virus or viruses. Results from some 70,000 tests indicate that very few, if any, peach or cherry trees are free of viruses. Portions of the latent complex appear to be transmitted through most, if not all, mazzard, mahaleb and peach seeds. [Authors' summary.]—Tree Fruit Experiment Station, Wenatchee, Wash.

1335. MEZZETTI, A.

Una perforazione delle foglie del susino di origine non parassitaria. (A non-parasitic shot hole disease of plum.) [English summary 9 lines.]
Ann. Sper. agrar., 1951, 5: 1003-8, bibl. 2.

The author describes plum leaf lesions found in orchards in Emilia which consist of round chlorotic spots a few millimetres across, often with a brown

speck in the centre. These patches fall out, leaving holes. Methods are given for distinguishing them from other common leaf affections. Virus origin is suggested.

1336. BLUMER, S.

Über das Bandmosaik an Zwetschenbäumen. (Line pattern in zwetschen.)
Schweiz. Z. Obst- u. Weinb., 1951, 60: 451-4, bibl. 3, illus.

Line pattern, while quite a common virus disease of zwetschen and plums in Switzerland, is of negligible importance, the symptoms appearing only on the leaves. There are indications, however, that the severity of disease increases when the line pattern virus is combined with other viruses and a complex infection results. This is supported by reports from Bulgaria, where the disease, or complex of diseases, is a serious one, attacking the fruits as well. Transmission is effected by budding, hence selection is the only control measure recommended.

1337. NYLAND, G.

Further observations on yellow leaf roll of peach.

From abstr. in *Phytopathology*, 1951, 41: 942.

Observations on this virus disease have been made under field and greenhouse conditions. In many respects the disease resembles buckskin on peach. Among the differences are (1) the earlier appearance of symptoms of yellow leaf roll, (2) more rapid spread in the trees and in the orchards, (3) more rapid killing of limbs and trees, (4) greater persistence from one year to the next in diseased limbs, and (5) vein swelling in the field. Among the similarities are (1) characteristic leaf tattering due to abscission of laminal areas, (2) leaf casting, and (3) killing of sweet cherry on Mahaleb root. The similarities suggest a strain relationship between the causal agents of yellow leaf roll and buckskin.

1338. COCHRAN, L. C., AND McCLAIN, R. L.

Breaking patterns produced on peach flowers by the ring-spot virus.

From abstr. in *Phytopathology*, 1951, 41: 936-7.

On some peach trees up to 25% of the flowers showed patterns; these trees had no leaf symptoms of either mosaic or ring spot, but transmission tests showed that the ring spot virus was present.

1339. NICHOLS, C. W.

Histological studies of cherry fruits and pedicels of western-X little-cherry in Idaho.
From abstr. in *Phytopathology*, 1951, 41: 941-2.

Diseased pedicels were shorter and thicker than normal except near their base; their cortex also was thicker except near the base. Pith diameter of diseased pedicels was normal at the apical and basal ends, but larger than normal in the centre. Vascular bundle diameter was larger in the diseased pedicels throughout their length. The small size of diseased fruits and pedicels was due to lack of cell division rather than lack of cell elongation. Abscission layers functioned only in normal cherry fruit.

340. MULDER, D.
De Eckelrade virusziekte van zoete kersen.
(A virus disease of sweet cherries called
"Eckelrade" disease.) [English summary
 $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 217-28,
bibl. 10, illus.
- The most characteristic symptoms of the Eckelrade disease of sweet cherries in Holland are enations on the under side of the leaves, rosette formation, die-back of twigs, malformation and pronounced dentation of leaves, and little-leaf. The varieties particularly affected are Abbesse de Mouland and Bigarreau Napoleon. This disease bears some resemblance to the Pfeffinger disease. It is probably caused by the action of several viruses. In most trees it develops only slowly. It has been rarely found in nurseries, and is probably only spread by cultural operations such as budding and grafting.
1341. MULDER, D.
Een hypothese over de oorzaak van het verschil tussen primaire en secundaire symptomen bij de Eckelraderziekte van zoete kersen. (A hypothesis on the cause of the difference between primary and secondary symptoms of the Eckelrade disease of the sweet cherry.) [English summary 8 lines.]
Tijdschr. PlZiekt., 1952, 58: 21-4.
- The hypothesis is put forward that the appearance of secondary symptoms of the Eckelrade disease in fruit trees depends on whether the virus reaches the growing point without causing necrosis of the meristematic tissue. Necrosis of the growing point is considered to hinder or prevent the appearance of secondary symptoms.
1342. STOLL, K.
Über die Symptome der Pfeffingerkrankheit der Kirschbäume. (The symptoms of the Pfeffinger disease of cherry trees.)
Phytopath. Z., 1951, 18: 293-306, bibl. 15, illus.
- The effect of the cherry virus which induces Pfeffinger disease [*H.A.*, 21: 3383] on the morphological and anatomical structure of cherry leaves is described. The abnormal alterations in the leaves are mainly due to pathological changes in the veins. A positive test as phloroglucinol and hydrochloric acid for phloem necrosis in leaf petiole and veins gave fairly good results. Some pathological changes in the xylem are more frequent than phloem necrosis. Mottling, mosaic and ringspot occur. The origin and development of leaf enations and other pathological excrescences are discussed.
1343. CADMAN, C. H.
Studies in *Rubus* virus diseases. I. A latent virus of Norfolk Giant raspberry.
Ann. appl. Biol., 1951, 38: 801-11, bibl. 11, illus.
- A selection of Norfolk Giant raspberry is infected with a virus transmissible by *Amphorophora rubi* Kalt. after short feeding periods on infected plants and persisting for at least $18\frac{1}{2}$ hr. in the aphid. This virus is identified as one which is carried without symptoms by Norfolk Giant and Baumforth's Seedling B, and causes necrosis on *Rubus henryi* and mosaic symptoms on *R. saxatilis*, American black raspberry *R. occidentalis* (var. Cumberland) and the red raspberry varieties Chatham, Malling Landmark and St. Walfried. The virus is present in some commercial stocks of Baumforth's Seedling B, Burnetholm Seedling, and the Malling varieties Enterprise, Notable and Promise. The name raspberry leaf mottle is proposed. [Author's summary.]—University Coll., Dundee.
1344. KLESSER, P. J.
A virus disease of red currant (*Ribes rubrum* L.)
Ann. appl. Biol., 1951, 38: 707-12, bibl. 9, illus.
- A virus disease showing as ringspot patterns and vein clearing of red currant leaves is reported as found during the late summer of 1948 on two sets of red currant plants imported from Holland to England. The properties and host range of the virus are different from those of other viruses causing ringspot symptoms, and the name red currant ringspot virus is therefore suggested.—Molteno Institute, Cambridge University.
1345. KENNEDY, J. S.
Benefits to aphids from feeding on galled and virus-infected leaves.
Nature, 1951, 168: 825-6, bibl. 3.
- It has been shown in earlier trials at the Zoological Laboratories, Cambridge, that certain aphids prefer growing or senescing leaves to mature ones. A note is now given describing pathological changes which are also beneficial to the aphids initiating them. *Cryptomyzus ribis* showed a marked preference for feeding on the galls of red currant leaves induced by itself, and multiplied faster where it preferred to feed. *Aphis fabae* on sugar beet leaves behaved similarly, the rate of multiplication being considerably greater on mosaic diseased leaves than on healthy ones. It appears that the disease rendered the whole plant, and not merely the mature leaves, more suitable for this vector.
1346. MILLER, P. W.
Number of aphids and time required for the transmission of strawberry yellows.
Plant Dis. Repr., 1951, 35: 262-3, bibl. 6.
- Experimental results show that a single wingless viruliferous aphid may, under greenhouse caged conditions, transmit strawberry yellows [yellow-edge] to *Fragaria vesca* after relatively short feeding periods (1 to 3 hours). It appears essential, therefore, to control the insect vector absolutely in areas where certified plants are propagated and isolation is not complete, if the spread of yellows is to be prevented. [See also *H.A.*, 16: 1890; 18: 2558.]
1347. FREITAG, J. H.
Host range of the Pierce's disease virus of grapes as determined by insect transmission.
Phytopathology, 1951, 41: 920-34, bibl. 10, illus.
- The Pierce's disease virus of the grape vine was transmitted experimentally to 75 species of plants belonging to 23 families. The plants are listed and the results shown. A list is also given of plant species naturally infected by the virus as shown by the recovery of the virus from the insect vectors.—Univ. of Calif.

1348. SCARAMUZZI, G.

La leptonecrosi dell'olivo nella zona di Albenga. (Phloem necrosis of olive in the district of Albenga.)

Olearia, 1951, 5: 225-31, bibl. 4.

The symptoms of a disease which may bring about the death of 5- to 10-year-old olives in 2 or 3 years or that of older plants much more slowly are here described. Essentially death occurs as the result of the gradual drying up of individual branches. The symptoms are: defoliation followed by centripetal desiccation of all leaf-bearing branches, chlorosis of part of the leaf lamina in affected parts, necrosis of the phloem on twigs and branches of larger diameter, necrosis of the cortical and woody tissues on some of the larger and main branches. While no definite proof is yet to hand, the symptoms strongly suggest virus origin.

Bacteria.

(See also 1485b, p, 1988.)

1349. TUFTS, W. P.

Fire blight control in California.

Amer. Fruit Gr., 1952, 72: 2: 40-1.

Apart from scrupulous orchard hygiene the following recommendation is made for the control of fire blight on pears: "Starting when possibly 10 to 20% of the blossoms have opened and continuing throughout the blooming season at 4 to 10 day intervals, depending upon weather conditions, apply a 10-90 copper-lime dust at the rate of 40 to 50 lb. per acre or a $\frac{1}{2}$ - $\frac{1}{2}$ -50 to $\frac{1}{2}$ - $\frac{1}{2}$ -50 bordeaux spray or a fixed copper spray of the same concentration."

1350. STARR, M. P., CARDONA, C., AND FOLSOM, D.

Bacterial fire blight of raspberry.

Phytopathology, 1951, 41: 915-19, bibl. 12, illus.

A bacterium isolated from diseased plants of the Latham red raspberry in Maine and shown experimentally to be the cause of the disease is closely related to the pear blight organism and has been named *Erwinia amylovora* f. sp. *rubi* f. sp. nov.—Univ. Calif.

1351. ARK, P. A., AND SCOTT, C. E.

Elimination of crown gall.

Calif. Agric., 1951, 5: 7: 3, illus.

Crown gall (*Agrobacterium tumefaciens*) can be effectively controlled in young almond and peach trees by exposing the galls in autumn or winter, cleaning them with a brush, and painting them with a mixture of 1 part 20% Elgetol and 4 parts methanol (synthetic wood alcohol). The same treatment is effective with walnuts provided all the galled tissue and about 1 in. of the surrounding tissue is scraped off.

1352. DIMOND, A. E., STODDARD, E. M., and RICH, S.

The effect of dyes in retarding the development of crown galls.

Phytopathology, 1951, 41: 911-14, bibl. 12.

Malachite green and brilliant green at 0.0036% in nutrient agar plates were highly toxic to the crown gall organism, *Agrobacterium tumefaciens*, and eosin was moderately toxic. The size of galls may be reduced by hypodermically injecting dyes into tomato stems just prior to, but not after, inoculating them with the crown

gall bacterium. The dyes which were effective were not always toxic to bacteria *in vitro*. Those most effective when the stems were treated 2 days before inoculation were malachite green, chlorophenol red, and aniline blue.—Conn. agric. Exp. Stat.

1353. BLANCHARD, F. A.

Aureomycin chemotherapy of crown gall in tomatoes.

Phytopathology, 1951, 41: 954-8, bibl. 16, illus.

Fewer and smaller galls developed on tomato plants grown in a solution of aureomycin hydrochloride (Lederle) in mineral nutrient following needle inoculation with *Agrobacterium tumefaciens* than on similar plants grown in mineral solution alone. A dosage of 20 µg. per ml. gave practically complete control.—Univ. of Cincinnati, Ohio.

1354. DYE, D. W., HUTCHINSON, P. B., AND HASTINGS, A.

Effect of chemicals and antibiotic substances on crown-gall (*Agrobacterium tumefaciens*) (Smith and Townsend) Conn.). I. Colchicine and penicillin.

N.Z. J. Sci. Tech. Sec. A, 1950 [issued 1951], 31: 6: 31-9, bibl. 8, illus.

Aqueous solutions (0.5% and 2.0%) of colchicine, tested on marigolds and tomatoes under glass, effectively prevented the formation of bacterial tumours and either killed the healthy growing galls or retarded their further development. Smearing the stem or gall with a lanolin paste containing the solution was more effective than injection or brushing on the solution. Commercial penicillin at water solution concentrations of 15 × 150 Oxford units per ml. did not prevent or check tumour growth.

1355. DYE, D. W., AND HUTCHINSON, P. B.

The effects of chemicals and antibiotic substances on crown-gall (*Agrobacterium tumefaciens* (Smith and Townsend) Conn.) Part II.

N.Z. J. Sci. Tech. Sec. A, 1950 [issued 1951], 32: 1: 39-43, bibl. 4.

The antibiotic substances streptomycin and actinomycin used at a concentration equivalent to 50 Oxford units per ml. against *Staphylococcus aureus* tested on marigold plants under glass, neither prevented gall formation nor retarded their further development. Acenaphthene in saturated filtered aqueous solution also gave negative results. When it was applied as a 5% solution in dioxane (diethylene oxide) and full strength dioxane alone, gall formation was prevented and the development of previously growing galls was significantly retarded. As there was no significant difference between the effect of 5% acenaphthene in dioxane and dioxane alone, the result with acenaphthene was probably caused by dioxane alone. Iodine and clove oil solutions caused rapid death of most plants.

1356. DYE, D. W.

The effects of chemicals and antibiotic substances on crown-gall (*Agrobacterium tumefaciens* (Smith and Townsend) Conn.) Part III.

N.Z. J. Sci. Tech. Sec. A, 1951, 33: 3: 48-53, bibl. 4.

Chemical and antibiotic solutions were tested for the control of crown-gall on marigold (*Tagetes patula*) stems, and one material (elgetol) on peach seedling galls. They were applied by injection, smearing, and brushing. Crude and commercial penicillin neither killed galls nor retarded their further development. A 25% solution of elgetol in methyl alcohol effectively killed galls on peach seedlings without damaging the plants, but severely injured marigold plants. A 2% elgetol solution, iodine, and clove oil solutions, when smeared or brushed on, caused rapid death of marigold galls without damaging the plants, but killed the plants when injected.—D.S.I.R., Auckland, N.Z.

1357. MOHANTY, U.

Corynebacterium fascians (Tilford) Dowson; its morphology, physiology, nutrition and taxonomic position.

Trans. Brit. mycol. Soc., 1951, 34: 23-34, bibl. 23.

A bacteriological study of the organism associated with the cauliflower disease of strawberry and of the garden pea, and leafy gall of a number of ornamental plants.—Imperial Coll., London.

Fungi.

1358. COMMONWEALTH MYCOLOGICAL INSTITUTE.

Distribution maps of plant diseases.

Commonwealth Mycological Institute, Kew, Surrey, 1951.

Maps of horticultural interest issued during 1951 show the distribution of:

217. *Leveillula taurica* (Lev.) Arn. on various hosts.

218. *Thielaviopsis basicola* (Berk. & Br.) Ferraris on tobacco, etc.

221. *Plasmopara viticola* (Berk. & Curt. ex de Bary) Berl. & de Toni on vine.

222. *Peronospora antirrhini* Schroet. on *Antirrhinum majus*.

223. *Puccinia pruni-spinosae* Pers. on peach, plum, apricot, almond, cherry, etc.

224. *Puccinia cannae* (Wint.) P. Henn. on *Canna* spp., etc.

228. *Ramularia vallisumbrosae* Cav. on narcissus.

229. *Ramularia armoraciae* Fuckel on horse-radish.

232. *Sphaceloma perseae* Jenkins on avocado pear.

233. *Spondylocidium atrovirens* Harz. on potato.

234. *Sphaceloma ampelinum* de Bary on vine.

240. *Fusarium albedinis* (Killian & Maire) Malençon on date palm.

1359. HAMILTON, J. M., AND PALMITER, D. H.

Orchard tests for apple scab control in New York State. I. Sulfur fungicides.

Bull. N.Y. St. agric. Exp. Stat. 747, 1951, pp. 63.

Ten years of orchard testing (1935-44) of sulphur sprays for apple scab control had the object of establishing the place of wettable sulphurs in the spray programme and so of eliminating the injury and reduction in yield caused by liquid lime-sulphur. Factors influencing choice of fungicide, timing of applications, infection periods, particle size, mineral dosage, adjuvants, comparison of wettable sulphurs with lime-sulphur, and mixed fungicide programmes are discussed. Eight applications timed to protect the

new growth during infection periods proved sufficient for the control of scab in McIntosh orchards having an abundant primary inoculum in years favourable for disease development. Magnetic "70" and the flotation sulphur pastes at concentrations of about 4 lb. of actual sulphur to 100 gal. were as effective, on the average, against scab as lime-sulphur over a period of 7 epidemic scab years.

1360. WADE, G. C.

Black spot [scab] of apples. Results of investigations in 1949-50 and 1950-51 seasons.

Tasm. J. Agric., 1951, 22: 293-303, bibl. 4, illus.

Experimental work described has indicated that ground sprays of sodium dinitro-ortho-cresylate reduce black spot incidence under Tasmanian conditions. In both seasons under review the ascospore discharge occurred late and no advantage was obtained by two green tip applications of bordeaux mixture or copper oxychloride as compared with a single application. Fresh bordeaux proved superior to copper oxychloride or "Phygon" at the green tip. Later "Phygon" gave outstanding control of scab both on leaves and fruit, but caused about the same amount of spray russet as a lime-sulphur schedule. "T.M.T.D." gave very good control of black spot and the fruit were freer from russet than with any other treatment tested. "Fermate" also gave good results for control of fruit infection, but was less effective than "T.M.T.D." for control of leaf infection. Colloidal sulphur as a cover spray caused less spray russet than lime-sulphur, and gave a similar measure of spot control. However, it was less effective than lime-sulphur for the calyx spray. Neither the use of lime-sulphur stronger than 1 in 80 at the calyx, nor the addition of 1 in 160 lime-sulphur to colloidal sulphur cover sprays appear desirable. The calyx stage appears a critical period for fruit injury by sprays. Colloidal sulphur gave better control of powdery mildew than any of the newer fungicides, while lime-sulphur was intermediate. No definite evidence of bud scale infection in the seasons under review was obtained. [Author's summary.]

1361. LOUW, A. J.

Studies of the influence of environmental factors on the overwintering and epiphytology of apple scab [*Venturia inaequalis* (Cke.) Wint.].

Sci. Bull. Dep. Agric. S. Afr. 310, being *Fruit Res. Ser.* 24, 1951, pp. 48, bibl. 44.

The author's investigations showed that in the winter rainfall area of the Cape primary scab infection was caused by ascospores, not by conidia. Moisture was found essential for the development of the perithecia. Drying of the leaves after leaf fall reduced it. Perithecia were most abundant below 13° C. and scarce above 20° C. The conclusion was reached that in the area under consideration the severity of scab epiphytology is influenced by: (a) The time of leaf-fall of apple trees in autumn and the moisture and temperature conditions following leaf-fall and during the winter, which factors determine the abundance of ascospores and the extent to which their maturation synchronizes with the exposure of susceptible host tissue in spring. (b) Moisture conditions after growth initiation of the

host plant in the spring, which influence the amount of infection which occurs.

1362. GREWE, F.

Zur Frage der Bekämpfung des Apfelschorfs (*Venturia inaequalis* Ad.) auf der Grundlage eines Warndienstes. (Apple scab control on the basis of a warning service.)

Höfchen Briefe, 1951, 4: 216-24, bibl. 6.

An account of observations on the incidence of apple scab. It is concluded that in timing spray applications the development of the fungus is of greater importance than the biologic cycle of the host plant, and that the establishment of a warning service in Germany similar to that functioning in Belgium is desirable.

1363. PASQUI, G., AND RICCI, P.

Ricerche su la possibilità e la convenienza dell'istituzione di stazioni d'avviso contro la ticchiolatura del melo (*Venturia inaequalis*) in Romagna. (Investigations on the possibility and advisability of establishing apple scab warning stations in Romagna.) *Ann. Sper. agrar.*, 1951, 5: 1309-21, bibl. 9.

Trials here described show that the process of ripening of the perithecia of the apple scab fungus can be followed and hence the period of ascospore discharge determined in advance. This makes a warning service possible.

1364. BLUMER, S.

Das Auftreten des Apfelmehltaus und seine Bekämpfung im Jahre 1951. (The appearance of apple mildew and its control in 1951.) *Schweiz. Z. Obst- u. Weinb.*, 1951, 60: 501-5, bibl. 2, illus.

Apple mildew has been widespread in the whole of Switzerland and chemical treatment alone was found inadequate for its control. In trials at Wädenswil 4 pre-blossom and 2 post-blossom sprays with wettable sulphurs, to which a wetting agent was added, supplemented by pruning in June, when the affected shoots were easily recognizable, resulted in a significant reduction of disease incidence.

1365. CROXALL, H. E., COLLINGWOOD, C. A., AND JENKINS, J. E. E.

Observations on brown rot (*Sclerotinia fructigena*) of apples in relation to injury caused by earwigs (*Forficula auricularia*). *Ann. appl. Biol.*, 1951, 38: 833-43, bibl. 7, illus.

Orchard observations and laboratory experiments showed that brown rot infection of Cox's Orange Pippin and Laxton's Superb apples in West Midland orchards in 1947-50 occurred through injuries caused by earwigs. Bands of sacking soaked in BHC placed round trunks of Laxton's Superb trees trapped many earwigs and there was less brown rot on banded than on unbanded trees. The damage was appreciable in a number of grass orchards but negligible in arable plantations.—N.A.A.S. Laboratory, Evesham, Worcs.

1366. BYRDE, R. J. W.

Experiments on the control of brown rot of apples and plums. I. Laboratory tests. *J. hort. Sci.*, 1952, 27: 130-44, bibl. 18, illus.

Precision spore germination tests showed the high

toxicity of phenyl mercury chloride and 2: 3-dichloro-1: 4-naphthaquinone towards conidia of *Sclerotinia laxa* and *S. fructigena*. In preliminary laboratory tests, several newly-introduced fungicides showed promise, notably N-trichloromethylthiotetrahydrophthalimide, bis (2-hydroxy, 5-chlorophenyl) sulphide, and two substituted 4-nitrosopyrazoles. Laboratory tests on the effect of fungicides on the mycelial growth of *S. laxa* in potato dextrose agar showed that several materials toxic to the conidia at less than 10 p.p.m. were relatively ineffective at 100 p.p.m. against the mycelium. Phenyl mercury chloride and sodium pentachlorophenate were the most effective compounds in these mycelial tests. [Author's summary.]—Long Ashton Research Station.

1367. GENTILUCCI, T.

Il *Coryneum follicolum* Fuck. quale agente di "marciume del cuore" delle mele in Italia. (*Coryneum follicolum* causing heart rot of apples in Italy.) *Ann. Sper. agrar.*, 1951, 5: 1295-1307, bibl. 18.

A bibliographical review of the importance of *Coryneum follicolum* is followed by a study of its life history under natural and artificial conditions. This is the first recorded appearance in its present role in Italy.

1368. CLAYTON, C. N.

Botrytis leaf spot of apple in North Carolina. *Plant Dis. Repr.*, 1951, 35: 237, illus.

Irregular spots from a few millimetres to more than 2 cm. in diameter were found associated with the presence of a *Botrytis* on the dead tissues. Usually an infected dead blossom part, such as a petal or anther, was adhering to the affected tissue. Spraying with four different materials reduced the amount of spotting.

1369. CANOVA, A.

Cascola parassitaria delle gemme di melo. (Fall of apple buds caused by a parasite.) *Inform. fitopat.*, 1951, No. 8, pp. 1-3, illus.

A serious fall of unopened flower buds of apple trees in Reggio E., Italy, during winter is found to be associated with the presence of *Fusarium lateritium* var. *fructigenum* in the buds, and the disease is probably identical with that known in England as bud rot. Control measures have not yet been ascertained.

1370. SIEBS, E.

Über die Schorfanfälligkeit von Birnen und die Aussichten auf ihre Resistenzzüchtung. (Pear scab infection and the prospects of breeding resistance.) *Phytopath. Z.*, 1951, 18: 270-86, bibl. 12, illus.

Inoculations on 2- and 1-year-old pear seedlings, the progeny of open pollinated flowers of ordinary pear varieties and of those grown for their juice indicate that the latter transmit resistance to their progeny to a greater degree than relatively resistant garden varieties. Susceptible garden varieties yield a high percentage of relatively resistant seedlings.

1371. GOVI, G.

Un cancro rugoso del pero causato da *Phomopsis mali* Rob. (Pear dieback due to *Phomopsis mali*.) [English summary 12 lines.] *Ann. Sper. agrar.*, 1951, 5: 791-803, bibl. 11.

The author discusses the somewhat varied published accounts of the symptoms of this disease on pear which results in canker and dieback of the branches attacked. He concludes they are all manifestations of the same disease.

1372. OSTERWALDER, A.
Vom "Bleiglanz" der Pfirsichblätter.
(Silver leaf on peaches.)
Schweiz. Z. Obst- u. Weinb., 1952, 61:
43-5, illus.

A note on the rare appearance of silver leaf on fruit trees in Switzerland, followed by a discussion on its causal agent, *Stereum purpureum*. Evidence is presented, however, showing that silver leaf can occur without being caused by a fungus.

1373. HIGDON, R. J.
The control of pecan scab by fungicides.
Plant Dis. Repr., 1951, 35: 272-3.
Bordeaux mixture, Orthocide 406, and bordeaux mixture-Ziram controlled the pecan scab fungus (*Cladosporium effusum*) sufficiently to allow good quality nuts to be produced. Ziram alone was unsatisfactory.

1374. BLUMER, S.
Die Bekämpfung der Sprühfleckenkrankheit an Kirschbäumen (*Cylindrosporium padi*).
(The control of *Cylindrosporium padi* on cherries.)
Schweiz. Z. Obst- u. Weinb., 1951, 60:
505-7, illus.

Incidence of leaf spot caused by *Cylindrosporium padi* has been widespread in the nursery of the Wädenswil Research Station in recent years, particularly on vegetatively propagated rootstocks. The susceptibility of individual rootstocks varied considerably; clones F12/1 and F2/2 from East Malling were found comparatively resistant. In control trials in 1950 the carbamate M555 was more effective than wettable sulphur, while in 1951 the reverse was the case. A new, not yet released chemical (X), showed good promise in 1951.

1375. PITCHER, R. S., AND WEBB, P. C. R.
Observations on the raspberry cane midge (*Thomasiina theobaldi* Barnes). II.
"Midge blight", a fungal invasion of the raspberry cane following injury by *T. theobaldi*.
J. hort. Sci., 1952, 27: 95-100, bibl. 10, illus.

The tissues of raspberry canes damaged by the cane midge are frequently invaded by fungal pathogens which may cause the death of the cane before it can bear fruit the following year. This disease is given the name "Midge blight". The fungi principally involved are *Fusarium culmorum*, *Didymella applanata* and *Leptosphaeria coniothyrium*. Spores of all three were found on the epidermis of healthy canes, but none could be cultured from the exterior of adult cane midges, so it is concluded that the midge larvae produce a substrate suitable for the development of spores of the pathogens which are already on the canes. Each of the three fungi are illustrated as producing fructifications on the midge lesions.—East Malling Research Station.

1376. BUTLER, E., AND KING, T. H.
Strawberry root-rot in Minnesota.
Plant Dis. Repr., 1951, 35: 238-9, bibl. 4.

About 20 different fungi were isolated from black sunken lesions or black girdled areas on strawberry roots [*H.A.*, 4: 222, 565]. Only three of the organisms, *Hainesia lythri*, *Coniothyrium fuckelii* and *Rhizoctonia solani*, proved pathogenic.

1377. HICKMAN, C. J., AND ENGLISH, M. P.
Factors influencing the development of red core in strawberries.
Trans. Brit. mycol. Soc., 1951, 34: 223-36, bibl. 8.

This is an account of pot experiments on the influence of soil moisture and pH on the development of red core of strawberries caused by *Phytophthora fragariae*. Maximum infection occurs under conditions that promote the liberation of zoospores, namely high soil moisture resulting from frequent applications of water to a freely draining soil or by waterlogging from below. The influence of soil moisture on the disease varied with soil texture; in general, the lighter the texture the more the infection. The amount of infection decreased with rise in pH to the alkaline side, and little infection occurred in most of the alkaline soils tested, although in some the disease was severe. Red core has not been recorded in the large strawberry-growing area around Wisbech and King's Lynn, where alkaline soils predominate and, even though alkalinity may not always be a limiting factor, the absence of the disease can be explained in terms of low rainfall and excellent drainage.—Birmingham University.

1378. HICKMAN, C. J., AND ENGLISH, M. P.
The susceptibility of strawberry varieties to red core.
Trans. Brit. mycol. Soc., 1951, 34: 356-9, bibl. 3.

Using a standardized pot infection technique, experiments showed that rapid and reliable estimates may be made of varietal susceptibility to red core disease caused by *Phytophthora fragariae* Hickman. Comparison of the pathogenicity of a number of isolates of *P. fragariae* to three varieties of strawberry, Huxley, Perle de Prague and Auchincruive Climax, established the existence of at least three physiologic races within the species. [Authors' summary.]—Birmingham University.

1379. SMITH, H. C.
Red-core (*Phytophthora fragariae*) of strawberries.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 1: 49-55, bibl. 6, illus.

Strawberry red-core has been serious in New Zealand for many years. It is widely distributed in the Dominion and appears to be a major factor in causing strawberries to be grown as an annual crop in the Auckland District. Its symptoms and the morphology of the fungus are described. Control may be secured by planting disease-free runners in clean ground.—D.S.I.R. Auckland, N.Z.

1380. NELSON, K. E.
Effect of humidity on infection of table grapes by *Botrytis cinerea*.
Phytopathology, 1951, 41: 859-64.

In the experiments recorded the length of the wet period was not significant in the development of infection by *Botrytis cinerea* on California-grown table grapes, when clusters were inoculated and kept wet for different periods at 12° C., then dried and incubated at r.h. levels above 94%. Eighty-five to 100% of the berries were infected whether the wet period was 1 or 18 hours. At lower humidity levels the wet period became increasingly significant. At r.h. levels of 85 to 90%, considerably more infection occurred through the capstem than through the skin of the berry. This was due either to invisible residual water around the capstem or to rapid transpiration from that area which, in effect, lengthened the shorter wet periods.—U.S. Department of Agriculture, Fresno, California.

1381. DELP, C. J., HEWITT, W. B., AND NELSON, K. E.

Cladosporium rot of grapes in storage.

From abstr. in *Phytopathology*, 1951, 41: 937-8.

Rot, caused by *Cladosporium herbarum*, occurs periodically on stored grapes in California; the symptoms are well defined black areas covered by the epidermis. A close correlation was found between the incidence of the disease and rainfall during or shortly before harvest.

Nematodes.

(See also 1657-1660, 1829, 1990.)

1382. KOTTHOFF, P.

Die wichtigsten pflanzenschädlichen Nematoden. (The most important nematodes which damage plants.)

Höfchen Briefe, 1951, 4: 191-216, illus.

A comprehensive, well illustrated paper describing nematodes attacking agricultural and horticultural plants, the damage they cause and control measures recommended.

1383. GOODEY, J. B.

Observations on the attack by the stem eelworm, *Ditylenchus dipsaci*, on strawberry.

Ann. appl. Biol., 1951, 38: 618-23, bibl. 10, illus.

Four biologic races of *Ditylenchus dipsaci* can cause stem eelworm disease on twelve varieties of strawberry, viz. Marshall, Sir Joseph Paxton, Huxley, Royal Sovereign, Madame Lefebvre, Perle de Prague, Oberschlesien, Tardive de Leopold, Climax, Jucunda, Charles Lane and Early Cambridge.—Rothamsted Experimental Station.

Mites.

1384. BLAIR, C. A., AND GROVES, J. R.

Biology of the fruit tree red spider mite *Metatetranychus ulmi* (Koch) in south-east England.

J. hort. Sci., 1952, 27: 14-43, bibl. 42, illus.

An account of the fruit tree red spider mite is given with details of its synonymy, distribution and life cycle. It is most serious as a pest in the south-east of England, but it is becoming more persistent in other areas also. There are considered to be five chief factors influencing

populations of the mite, viz. (1) the number of generations in each season, which in Essex and Kent has been five, (2) the action of the predators, (3) the effect of weather conditions, warm weather increasing the mite's metabolism, (4) effect of spray programme, no really efficient spray has yet been found to control the mite and many sprays cause increase in mite population, (5) dispersal phase of the mite, causing it to move from one orchard to another. There are records of the mite on over 80 species of plant; the authors have found it on all the common cultivated deciduous fruits, on 12 species of trees and shrubs from hedgerows and gardens, and on 11 species of orchard weeds. There is no wholly resistant variety of apple or plum, but Bramley's Seedling and Victoria plum are less seriously damaged than other varieties. The external and internal damage to the leaves is described and considered.—East Malling Research Station.

1385. COLLYER, E.

Biology of some predatory insects and mites associated with the fruit tree red spider mite (*Metatetranychus ulmi* (Koch)) in south-eastern England. I. The biology of *Blepharidopterus angulatus* (Fall.) (Hemiptera-Heteroptera, Miridae).

J. hort. Sci., 1952, 27: 117-29, bibl. 15, illus.

The development of the fruit tree red spider mite is traced through the last 30 years in relation to the introduction of tar oil spraying and the subsequent improvements in methods and materials of spraying generally. The black-kneed capsid, *Blepharidopterus angulatus*, is the chief predator of the mite in commercial orchards; its eggs cause typical "bumps" in the young apple wood in which they are laid in late summer.—East Malling Research Station.

1386. BACHMANN, F.

Über die Wirkung organischer Schorfbekämpfungsmittel gegen Spinnmilben. (The effect of organic scab control sprays on mites.)

Schweiz. Z. Obst- u. Weinb., 1951, 60: 448-9.

A brief note supported by experimental evidence stating that neither thiuram- nor thiocarbamate-preparations have any appreciable effect on red spider mites.

1387. BARNES, M. M.

Studies with acaricides for control of mites in apple and pear orchards in Southern California.

J. econ. Ent., 1951, 44: 672-84, bibl. 15, being *Pap. Calif. Citrus Exp. Stat.* 683.

Results are presented of orchard studies conducted from 1947 to 1950 with 18 acaricides for the control of the 2-spotted spider mite, *Tetranychus bimaculatus*, European red mite, *Paratetranychus pilosus*, and clover mite, *Bryobia praetiosa*, on apple trees, and the Pacific mite, *T. pacificus*, and 2-spotted spider mite on pear trees.

1388. LATHROP, F. H.

Sidelights on European red mite control.

J. econ. Ent., 1951, 44: 509-14, bibl. 6.

Sulphur dust with lead arsenate concentrated in a mist

spray, applied throughout the post-blossom period, promoted severe infestation of European red mite on McIntosh apple trees. Foliage injury due to the interaction of spray damage and mite activity was serious. TM-2 with lead arsenate gave good control of the red mites, but was somewhat less effective than sulphur for scab control. Predators kept the red mite populations at a low level on trees which did not receive post-blossom treatments or were sprayed with lead arsenate only.—Me agric. Exp. Stat.

1389. LIENK, S. E., AND CHAPMAN, P. J.

Influence of the presence or absence of the European red mite on two-spotted spider mite abundance.

J. econ. Ent., 1951, **44**: 623, bibl. 2, being *J. Pap. N.Y. St. agric. Exp. Stat.* **855**.

While competition of the European red mite may be an important factor in the suppression and late development of the two-spotted spider mite, trials carried out at Geneva, N.Y., have shown that even in the absence of the European red mite the two-spotted spider mite population built up relatively slowly and did not attain peak activity until mid August.

1390. GOVI, G.

Osservazioni su di una "foruncolosi" delle pesche. (Notes on "boil" disease of peaches.) [English summary 6 lines.] *Ann. Sper. agrar.*, 1951, **5**: 771-7, illus.

A description is given of a phenomenon on peach fruits of prominent purple spots, which are thought to be due, not to San José scale or to *Cladosporium carpophilum*, but to the feeding of some form of mite, though no particular mite has been found in action.

1391. SPIT, J. M., AND GROENEVELD, C.

Bestrijding van de "rodevruchtziekte" bij bramen. (Control of red berry disease of blackberries.) [English summary 4 lines.] *Meded. Dir. Tuinb.*, 1951, **14**: 229-31, illus.

The mite *Eriophyes assigi* causes much damage to blackberries by causing red berry disease. Experiments in Holland have shown that it can be effectively controlled by two sprayings with lime-sulphur or wettable sulphur, the first applied in May, the second in June.

1392. HUFFAKER, C. B., AND SPITZER, C. H., JR.

Data on the natural control of the cyclamen mite on strawberries.

J. econ. Ent., 1951, **44**: 519-22, bibl. 2.

In a trial in California strawberry plots treated with parathion had a heavy build up of cyclamen mites, *Tarsonemus pallidus*, while in untreated plots the predator, *Typhlodromus reticulatus*, gave a very satisfactory control of the mite.

1393. HOFMASTER, R. N., AND GREENWOOD, D. E.

Control of the two-spotted mite on strawberries.

J. econ. Ent., 1951, **44**: 514-19, bibl. 3.

In trials in Virginia dinitro capryl phenol crotonate, and mixtures of parathion and sulphur and parathion and C-854 were outstanding in their rapidity of action and lasting protection afforded against the two-spotted mite, *Tetranychus bimaculatus*. The herbicide 75% dinitro ortho secondary amyl phenol was again found

excellent against both weeds and mites [see also *H.A.*, 21: 1500 and 3539].

Insect pests.

(See also 1485w, 1519, 1983.)

1394. COMMONWEALTH INSTITUTE OF ENTOMOLOGY.

Distribution maps of insect pests. Series A. Commonwealth Institute of Entomology, 41 Queen's Gate, London, S.W.7, 1951.

Maps of horticultural interest issued during 1951 show the distribution of:

1. *Ceratitis capitata* (Wied.) (Mediterranean fruit-fly) on most deciduous and sub-tropical fruits.
2. *Aonidiella aurantii* (Mask.) (California red scale) on *Citrus*, various deciduous fruit trees, wide range of shrubs and flowering plants.
3. *Chrysomphalus dictyospermi* (Morg) (Dictyospermum scale) on *Citrus*, various deciduous fruit trees, wide range of trees, shrubs and palms.
4. *Chrysomphalus ficus* Ashm. (*aonidium* auct.) (Florida red scale) on *Citrus*, wide range of Mono- and Dicotyledons.
5. *Diatraea saccharalis* (Fabr.) (sugar-cane borer) on sugar cane, maize, *Sorghum*, rice and grasses.
6. *Leptinotarsa decemlineata* (Say) (Colorado beetle) on potato, egg plant, tomato, various other cultivated and wild Solanaceae.
7. *Quadrastipidiotus perniciosus* (Comst.) (San José scale) on most deciduous fruit trees and bushes, wide range of other trees and shrubs.
8. *Cydia molesta* (Busck) (Oriental fruit moth) on peach and many other fruit trees, etc.
9. *Cydia pomonella* (L.) (Codling moth) on species of *Pyrus* (notably apple) and *Prunus*, walnut, etc.
10. *Gnorimoschema operculella* (Zell.) (potato tuber-moth) on potato, tomato, tobacco, egg plant and other Solanaceae.
11. *Pyrausta nubilalis* (Hb.) (European corn borer) on maize, hops, hemp (*Cannabis sativa*) and wide range of other hosts.

1395. BEEKENKAMP, G.

Winterbestrijding bij fruitteelt onder glas ? (The control in winter of the pests of fruit trees under glass.) *Fruitteelt*, 1951, **41**: 21-3, illus.

The control of pests of fruit trees grown under glass in the Netherlands is discussed. Seven of these pests are listed with reference to their occurrence on, or absence from, vine, peach and plum. Notes are given on their habits under those conditions, and on their possible control.

1396. AUTUORI, M., AND PINHEIRO, J. V.

Combate á saúva com brometo de metila. (Control of ants [*Atta* spp.] with methyl bromide.) *Biológico*, 1950, **16**: 147-59.

In trials carried out by the Biological Institute, São Paulo, methyl bromide was applied in gaseous form with a special fumigating machine to the nests of leaf-cutting ants (*Atta* spp.) in eucalyptus groves. When one injection was made per 10 sq. m., at the rate of 3 c.c. per sq. m., 87-84% of the nests treated were destroyed.

1397. BONNEMAISON, L.

Contribution à l'étude des facteurs provoquant l'apparition des formes ailées et sexuées chez les aphidinae. (The factors inducing the appearance of the alate and sexual forms of the Aphidinae.)

Ann. Epiphyt., * 1951, 2 (n.s.): 1-204; 205-380, bibl. many, illus.

This is a detailed study of the flight periods of the alate forms of certain aphids. It is in four parts: 1. Summaries of the morphology and biology of *Brevicoryne brassicae*, *Myzus persicae* and *Sappaphis plantaginea*. 2. Factors affecting the appearance of winged virginiparous forms. 3. Factors affecting the appearance of sexual forms. 4. A survey of the migration of aphids.

1398. UNTERSTENHÖFER, G.

Neue Entwicklungsmöglichkeit in der Blattlausbekämpfung mit chemischen Mitteln. (The possibility of new developments in the control of aphids with chemicals.)

Z. PflKrankh., 1951, 58: 268-75.

This is a review of recent advances in the preparation and application of insecticides for the control of aphids, with particular reference to systemic insecticides.

1399. BROADBENT, L., AND HOLLINGS, M.

The influence of heat on some aphids.

Ann. appl. Biol., 1951, 38: 577-81, bibl. 6.

The thermal death-points of 5 species of aphid, *Aulacorthum solani*, *Acyrtosiphon pisum*, *Macrosiphum euphorbiae*, *Myzus persicae* and *Brevicoryne brassicae*, removed from their host plants, lay between 38° and 41° C., when tested for 1 hr. at 60% R.H. After 1 hr. above 37-5° C. no *Myzus persicae* recovered and reproduced. Aphids on plants withstood temperatures higher than their thermal death-point off the plant.—Rothamsted Experimental Station.

1400. BIOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, VICTORIA.

Green and black peach aphid.

J. Dep. Agric. Vict., 1951, 49: 549-50.

Brief descriptions are given of the green peach aphid (*Myzus persicae*) and the black peach aphid (*Anuraphis persicae-niger*), with methods of control with special reference to the application of DDT and organic phosphate preparations.

1401. DAVIS, E. W., AND LANDIS, B. J.

Life history of the green peach aphid on peach and its relation to the aphid problem on potatoes in Washington.

J. econ. Ent., 1951, 44: 586-90, bibl. 8.

Large numbers of green peach aphid, *Myzus persicae*, are produced on peach trees each spring at Yakima, Washington. Both winged and wingless forms develop in each generation from the third onwards. The first colonies of the aphid are found on potatoes adjacent to peach orchards within a few days of the first winged forms being produced. The aphids are slow to reach potatoes some distance from the orchards at Yakima, and the lack of peach trees in other potato districts of Washington appears to be responsible for the late infestation of the potato crops in those areas. The life history of the green peach aphid at Yakima is

* Actually now: *Ann. Inst. nat. Rech. agron. Sér. C. Ann. Epiphyt.*

compared with observations made elsewhere, mainly in Germany.

1402. ZANGHERI, S.

Il cefto del pero. (The pear cephid.)

Inform. fitopat., 1951, No. 14, pp. 4-5, illus.

The life cycle of the pear cephid (*Janus compressus*) is outlined and the damage which its larvae cause by making galleries in young pear shoots is described. The only control measure is to collect and burn infested shoots not later than the middle of April before the adults appear.

1403. VENET, M.

Recherches biologiques et thérapeutiques sur le capnode noir des rosacées. (Biological and therapeutical investigations on the black capnodis beetle of rosaceous plants.)

Trav. orig. Serv. Déf. Vég. Maroc, 2, 1951, pp. 28.

An account of the life history, and habits, and attempts at control of *Capnodis tenebrionis* in Morocco. Trials showed that some protection was effected against the larvae by fine sea sand used alone or mixed with HCH or SPC; the sand apparently did not augment the action of the chemicals. In trials against the adult insects by the spraying of young trees, control was obtained with preparations containing calcium arsenate, a thiophosphoric ester, or DDT.

1404. RÉGNIER, R.

La destruction des hannetons par les traitements aériens et au sol. Historique des recherches françaises sur le hanneton commun. (Destruction of cockchafer by insecticides applied from the air and from the ground. A review of French work on the cockchafer.) [English summary $\frac{1}{2}$ p.] *Proc. 2nd int. Congr. Crop Prot.*, 1949, London, 1951, pp. 368-75.

French work on the control of cockchafers, which started in 1935, culminated in 1949 in two large-scale control operations at Etrépigny, Normandy, and Monthureux, Vosges, in which aeroplanes were used to apply HCH dust and ground machinery to apply SPC sprays. Woods, hedges and parks were treated. Final results are not reported here but some of the experiences gained in the technique of aerial control are discussed. [See also *H.A.*, 20: 166.]

1405. GASSER, R.

Expériences sur la lutte contre les hannetons (*Melolontha melolontha* L.). (Experiments in the control of cockchafers.)

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 151-7.

Good control of cockchafers was obtained by aeroplane applications of DDT at the beginning of May to forest edges in Switzerland. [See also *H.A.*, 21: 369 and 370.]

1406. VIEL, G., AND PROUST, J.

Action des poudres à base d'hexachlorocyclohexane sur les hannetons (*Melolontha melolontha* L.) en fonction de l'intensité du poudrage. (The action of hexachlorocyclohexane dusts on cockchafers in relation to the quantity applied.)

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 482-6, bibl. 4.

Laboratory experiments at the National Institute of Agronomic Research, Versailles, showed that cockchafer beetles will fall to the ground following very light applications of HCH. In order to ensure that the beetle does not recover from its initial intoxication, however, a minimum application of 5–10⁻³ mg. 10% HCH per sq. cm. leaf surface is necessary.

1407. MARSHALL, G. E.

White grub control in strawberries.

J. econ. Ent., 1951, 44: 668-71.

In trials in Indiana, BHC applied to freshly ploughed ground and worked into the soil by discing gave good control of grubs and improved the yields of strawberries. The cost was considerably below that of lead arsenate treatment.

1408. CHANDLER, S.

The plum and apple curculios as pests of apple.

Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 72-80, bibl. 4.

Apart from infesting peaches, plum curculio, *Conotrachelus nenuphar*, attacks apples in Illinois, though in certain areas the apple curculio, *Tachypterellus quadrigibbus*, has been responsible for some of the damage caused. The life history of both insects is given. In trials in 1949 two applications of chlordane, used at the rate of 1 lb. per 100 gal., reduced the percentage of damaged fruit considerably.

1409. SNAPP, O. I.

Plum curculio control with new organic insecticides.

J. econ. Ent., 1951, 44: 504-8, bibl. 8.

In experiments conducted in peach orchards in Georgia almost perfect control of plum curculio was obtained from 5 treatments of parathion, applied at the rate of 3 lb. of 15% wettable powder per 100 gal. Four applications of parathion or of chlordane, and a split schedule of BHC and lead arsenate were also satisfactory. In cage tests parathion, TM-2, insecticide 4049, methoxychlor, aldrin, dieldrin, and chlordane were effective against both over-wintered and new first-generation plum curculio adults. Apart from off-flavour caused by BHC in both fresh and canned peaches none of the other new insecticides damaged either fruit, foliage, buds or wood.

1410. WYLIE, W. D.

Insecticide tests against plum curculio.

J. econ. Ent., 1951, 44: 665-8, being *Res.*

Pap. J. Ser. Ark. agric. Exp. Stat. 1022.

Cage tests were conducted in Arkansas to compare the effectiveness of various insecticides with that of lead arsenate for plum curculio control on peaches. Methoxychlor, dieldrin and parathion gave the best results. No damage to fruit or foliage resulted from any of the materials used.

1411. CHANDLER, S.

Curbing the plum curculio.

Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 111-35, bibl. 3.

Results of various treatments in two or more peach orchards in Illinois have shown dieldrin to be the most effective spray and aldrin the best dust.

1412. COX, J. A.

Plum curculio control on prunes.*

J. econ. Ent., 1951, 44: 499-504, bibl. 10, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1645.

In trials in Pennsylvania, BHC, parathion, ethyl p-nitrophenyl thiobenzene phosphonate and dialkyl nitroaryl thiophosphates were found effective in killing both larvae and adults of plum curculio, *Conotrachelus nenuphar*. Three applications of dialkyl nitroaryl thiophosphates, however, injured the fruit of prune, while the other treatments were harmless to both fruit and foliage.

1413. WYLIE, W. D.

Technique in jarring for plum curculio.

J. econ. Ent., 1951, 44: 818-19, being *Res.*

Pap. J. Ser. Ark. agric. Exp. Stat. 1021.

Although no longer practised as a control measure, jarring is still considered valuable, particularly in research. The method and equipment described were used successfully on peaches in 1949 and 1950.

1414. VAPPULA, N. A.

The plum borer (*Rhynchites cupreus* L.) as a pest in Finland.

Proc. 8th int. Congr. Ent., 1949, Stockholm, 1950, from abstr. in *Rev. appl. Ent.*, 1951, 39: 302.

This borer has caused damage to apple trees in Finland during the past twenty years. In 1944, the main shoots of nearly all of about 180 young trees were destroyed and in another orchard of 100 young trees the first-year shoots of all were damaged. Shoot injury is occasionally reported on plum trees and more rarely on cherry and pear. Damage to young apple fruits appears to be less common, but has caused losses of 50-60%.

1415. EL ZOHEIRY, M. S.

The wasp beetle, *Chlorophorus varius* Mull. (Coleoptera-cerambycidae), a new pest of grape vines in Egypt.

Proc. 8th int. Congr. Ent., 1949, Stockholm, 1950, from abstr. in *Rev. appl. Ent.*, 1951, 39: 301.

This beetle was known in Egypt as a secondary pest of peach, apricot, apple, mulberry and *Robinia* up to 1945, but in 1946 its larvae were found in 3-year-old trunks and 2-year-old branches of grape vines of two varieties in a large plantation in Lower Egypt, and have since been found on other varieties. Carbon bisulphide injected into the wood of infested canes and stems during the dormant period gave complete control of the larvae in 24 hours and did not harm the vines.

1416. GALLAY, R., AND SAVARY, A.

La lutte contre le ver des cerises. (Control of cherry fruit fly.)

Rev. romande Agric. Vitic., 1951, 7: 76-9, illus.

Cherry fruit fly (*Rhagoletis cerasi*) can only be controlled by the co-operative effort of all the cherry growers in the district in applying a sequence of carefully timed DDT sprays starting 6-8 days after the first appearance of the adult flies. This is borne out

* See also *H.A.*, 22: 363.

by experience gained in Switzerland during 1951. Growers are urged to make use of the research stations in determining the exact dates for spray applications.

1417. COSOLO, A. G.

Considerazioni generali sul problema della lotta contro la mosca delle ciliege e risultati di esperimenti condotti nel Friuli. (The cherry fruitfly problem and the results of experiments at Friuli.)

Agric. Venezia, 1951, 5: 587-93, bibl. 15.

Recent trials show that products based on $C_6H_6C_{10}$, a synthetic inodorous hexachlorocyclohexane, or DDT applied at the proper time can effect a very considerable and adequate diminution in attack of the cherry fruit fly. Future trials with these and some of the phosphorus compounds will determine how many applications are necessary.

1418. SHERMAN, F.

Parathion to kill fruit fly maggots in cherries.

J. econ. Ent., 1951, 44: 809, being *J. Agr.*

Mich. agric. Exp. Stat. 1246.

Results of trials in Michigan have shown that 15% parathion, in amounts as low as 16 oz. in 100 gal., is very effective against maggots in both wild pin cherries, *Prunus pennsylvanica*, and Montmorency cherries.

1419. FLITTERS, N. E.

Vanda "Miss Agnes Joaquim" a host of *Dacus dorsalis*.

J. econ. Ent., 1951, 44: 799-802, illus.

Evidence is presented showing that there is no risk of introducing the Oriental fruit fly, *Dacus dorsalis*, to the United States with the orchid imported from Hawaii.

1420. COUTIN, R.

Essai de traitement du sol pour la destruction de la cécidomyie des poirettes. (Soil treatments for the control of pear midge.)

C.R. Acad. Agric. Fr., 1951, 37: 528-30, bibl. 8.

Infested fruits were buried in the ground in two plots in May. In December HCH was applied to one plot at the rate of 1.5 g. per hectare. Towards the end of the following March cages were placed over both plots to catch emerging adult midges. Only 16 were caught from the treated plot; from the other plot 2,270 midges and 50 parasites were captured. It is concluded that at present soil treatment with HCH is the best method of controlling the pear midge in orchards.

1421. PITCHER, R. S.

Observations on the raspberry cane midge (*Thomasiniana theobaldi* Barnes) I. Biology.

J. hort. Sci., 1952, 27: 71-94, bibl. 18, illus.

This account of the biology of the raspberry cane midge includes notes on distribution and external morphology. In the field there are usually three generations a year. Eggs laid under the broken epidermis of the raspberry cane give rise to colonies of pink larvae whose feeding damages the outer cortex. Pupation occurs in the cocoon in the surface soil at the base of the cane. The epidermis of raspberry canes often splits naturally, thus providing suitable shelter for the eggs and larvae. The amount of such splitting is often the most important factor affecting varietal susceptibility to midge damage.

Three hymenopterous parasites have been recorded, one of which may appreciably reduce the size of the later generations. Two predators of minor importance are also described.—East Malling Research Station.

1422. SANTORO, R.

Ricerche con prodotti organico-sintetici in rapporto a *Dacus oleae*, a entomoparassiti ed insetti varii eseguite in Ascea (Salerno) nel 1950. (Investigations on the effect of synthetic organic insecticides on the olive fly, on its predators and on various insects at Ascea (Salerno) in 1950.) [English summary $\frac{1}{2}$ p.]

Ann. Sper. agrar., 1951, 5: 1379-1404.

Destruction of insect life by the various organics tested tended to be indiscriminate. Since only olive trees were treated it is not possible to say whether insects from elsewhere will be able to restore the biological balance thus disturbed, but further experiments will deal with this problem. Products with DDT incorporated proved more lasting in their effects than others. Phosphoric esters tended to kill only very young larvae, the adults continuing to thrive. Temperatures between 16° and 24° C. favour olive fly; under Salerno conditions it then develops rapidly, only to be checked by high summer temperatures, to revive again in autumn and drop out with the first cold snap. The fly was found to avoid trees treated by the Russo method. In zones treated with Oleochlor the number of flies captured decreased for a few days only, whereas in those where DDT was used few flies were taken. Many more females were captured than males.

1423. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The harlequin bug (*Dindymus versicolor*).

Agric. Gaz. N.S.W., 1951, 62: 599-600, illus.

In New South Wales the harlequin bug infests a wide range of plants, including apple, fig, orange, grape, rhubarb, melon, pumpkin, tomato, dahlia, violet and other cultivated plants and various weeds. Where the bugs are found in numbers in sheds, or on fences, from which they might migrate to cultivated plants, a concentrated kerosene-DDT fly spray may be used to destroy them. A DDT emulsion spray, at a concentration of 0.1%, may be used to control them on most cultivated plants.

1424. ANTHON, E. W., AND WOLFE, H. R.

Erythroneura dolosa and *E. plena* on sweet cherry in Washington.

J. econ. Ent., 1951, 44: 614-15, bibl. 2, being *Sci. Pap. Wash. St. agric. Exp. Stat.* 1009.

DDT and parathion sprays gave good control of the leafhopper *E. dolosa*, the more important of the two species.

1425. WEINMAN, C. J., AND DECKER, G. C.

The toxicity of eight organic insecticides to the army-worm.

J. econ. Ent., 1951, 44: 547-52, bibl. 17.

Eight insecticides were tested for their contact and stomach poison action in laboratory trials. Parathion was found most toxic in both respects.

426. TAYLOR, G. G.
Spray treatments with DDT for control of codling moth (*Cydia pomonella* L.) in apple orchards.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 4: 60-5, bibl. 2.
 Field experiments on apples of the Sturmer variety in Hawkes Bay and Auckland showed that DDT, 2 oz. *p,p'* isomer to 100 gal. water applied at normal intervals throughout the season, gave control of codling moth comparable with that given by lead arsenate at 2 lb. to 100 gal. Much improved control was secured with DDT, 4 oz. *p,p'* isomer to 100 gal., whilst higher dosages appeared to be unnecessary for practical purposes. It was shown that DDT sprays applied from January onwards [in New Zealand] were more important in codling moth control than applications made earlier in the season. When DDT was applied throughout the season red-mite populations sometimes became heavy due to eradication of predacious insects. It was shown that by using lead arsenate, 2 lb. to 100 gal. water up to mid-December, and then introducing DDT, 4 oz. *p,p'* isomer to 100 gal., for later sprays, adequate control of codling moth was secured with minimum harm to beneficial predators. [Author's summary.]—D.S.I.R. Auckland, N.Z.
1427. EVENHUIS, H. H.
 Het nut van een bespuiting met loodarsenaat na de bloei ter bestrijding van het fruitmotje. (The benefit of calyx spraying with lead arsenate against codling moth.) [English summary 6 lines.]
Meded. Dir. Tuinb., 1951, 14: 265-8.
 It was found that a lead arsenate spray immediately after blossoming killed many codling moth larvae as they were trying to penetrate the fruitlets by the calyx. It is advisable to apply calyx sprays only when the codling moth is difficult to control otherwise.
1428. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
The peach tip moth (*Cydia molesta*).
Agric. Gaz. N.S.W., 1951, 62: 422-3, illus.
 The peach tip moth or oriental fruit moth was first seen in the Sydney district about 1909, and is now common in the coastal parts of the State and also in some inland areas. It attacks peaches, nectarines, quinces and occasionally apples. Its life-cycle is outlined. Control measures include DDT sprays, the removal of infested tips, and banding the trunks of the trees with corrugated paper impregnated with beta-naphthol. In some seasons its numbers are considerably reduced by various wasp parasites which attack the larvae.
1429. TURICA, A.
Cydia (Laspeyresia) molesta Busck. Datos bioecológicos para la zona del Delta del Paraná. (*Cydia (Laspeyresia) molesta* Busck. Bio-ecological data for the Paraná delta district [of Argentina].)
Idia, 1951, 4: 46: 23-31, bibl. 9, illus.
 A study is reported of the biological cycle of the apple pest *Cydia molesta* in the Paraná delta in relation to temperature conditions during 1949-51. This pest is responsible for 50% of the worminess of apples in the district. A lead arsenate and 50% DDT spray schedule is suggested which should give 98.6% control of *Cydia molesta*, *Carpocapsa pomonella* and *Oiketicus kirbyi*.
1430. HOUTMAN, G.
 Een schadelijke mineerder van het appelblad, het dwergmotje *Nepticula malella* Hb. (An injurious apple leaf miner, the micro-lepidopterous moth *Nepticula malella* Hb.)
Fruittelt, 1951, 41: 706-7, illus.
 The damage to apple leaves by *Nepticula malella* is described in detail, and the morphology and life-cycle of the moth are outlined. Control methods have not yet been elaborated but it has been found that spraying with parathion kills the larvae in the mined leaves. Possibly DDT or HCH would be effective during the flight period of the moth.
1431. GIANNOTTI, O., AND LEPAGE, H. S.
 Nota preliminar sobre o efeito de alguns inseticidas modernos sobre duas pragas do pessegueiro (*Ceratitis capitata* e *Grapholita molesta*). (Preliminary note on the effect of some modern insecticides on two peach pests (*Ceratitis capitata* and *Grapholita molesta*)).
Biológico, 1951, 17: 166-7.
 BHC, DDT, toxaphene and thiophosphate were used in a preliminary small-scale trial at the Instituto Biológico, São Paulo, Brazil. All the insecticides caused a marked reduction of fruit infestation by both Mediterranean fruit fly and oriental fruit moth, although DDT was least effective in control of the former.
1432. ŠEFTELI, I. M.
The biology of the peach moth in the Crimea.
 [Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1951, 16: 12: 26-9, illus.
 In the Crimea the peach moth, *Cerostoma persicella* F., damages leaves of peach and almond. Laboratory observations indicate that the leaves of other stone fruit trees, e.g. plum and cherry plum [*Prunus cerasifera*], may also be attacked by the larvae, but not those of sweet cherry and apricot. The life-cycle and feeding habits of the pest are described. Control measures recommended are two applications of a 2-3% suspension of DDT dust (20-30 g. per litre), the first when the leaf buds are bursting, the second when the laminae have expanded.
1433. SMITH, E. H.
Control of peach tree borer and lesser peach tree borer in New York.
J. econ. Ent., 1951, 44: 685-90, being *J. Pap. N.Y. St. agric. Exp. Stat.* 860.
 A programme consisting of 4 spray applications of parathion at the rate of 2 lb. (15% wettable powder) per 100 gal. is tentatively recommended for control of both peach tree borer, *Sanninoidea exitiosa*, and lesser peach tree borer, *Synanthedon pictipes*.

1434. DE JONG, D. J.

Bladrollers (Tortricidae) op vruchtbomen. Voorlopige resultaten van het onderzoek naar de bestrijdingsmogelijkheden in Nederland. (Preliminary investigations on apple and pear leafrollers.) [English summary $\frac{3}{4}$ p.]

Meded. Dir. Tuinb., 1951, 14: 131-50, bibl. 18, illus.

Bladrollers en hun bestrijding. (Tortrix moths and their control.)

Fruiteelt, 1951, 41: 450-1, illus.

These articles are chiefly concerned with *Capua reticulana* Hb., a species of tortrix unknown in the Netherlands ten years ago but now a troublesome pest. Its life cycle, the damage it causes, and field control experiments are described. Suitable insecticides were Parathion 0.015%, DDT-emulsion and wettable powder 0.1%, and a mixture of DDT 0.1% and Parathion 0.0075%. It was concluded that the best time for the application of insecticides is when the first young caterpillars hatch.

1435. GROVES, J. R.

Adoxophyes orana F.R. (Lep., Tortricidae), a moth new to Britain.

Ent. mon. Mag., 1951, 87: 259.

Adoxophyes orana: our new tortricid.

Fruitgrower, 1951, No. 2921, p. 1078, illus.

The new tortrix moth and its control.

Grower, 1951, 36: 1240-1, bibl. 4, illus.

First notes on a pest new to Britain which is causing alarm.

1436. GAUMONT, R.

Études embryologiques sur l'oeuf de cheimatobie *Operophtera brumata* L., Lépidoptère Geometridae. Action de la température sur l'embryogenèse et action du dinitrocrésylate de sodium sur quelques stades embryonnaires. (Embryology of the winter moth. The effect of temperature on embryogenesis and the effect of sodium dinitrocrésylate on certain embryonal stages.)

Ann. Épiphyt., 1950, 1: 253-73, bibl. 17, illus.

Details of the embryology of the winter moth are given. The sensitiveness of the embryo to sodium dinitrocrésylate diminishes with age until the formation of the temporary dorsal ectoderm, and then increases rapidly. From observations of treated eggs 12 hours after they are laid it is possible to determine rapidly for any particular product the practical lethal concentration.

1437. HILL, A. R.

The bionomics of *Lampronia rubiella* (Bjerkander), the raspberry moth, in Scotland.

J. hort. Sci., 1952, 27: 1-13, bibl. 17, illus.

In the eastern area of Scotland (Angus, Perthshire and Fife), this moth is one of the most serious pests in raspberry plantations. The plants are damaged only by the larva which is known to growers as the "borer". The life cycle, habits, damage caused by, and economic importance of the moth are described. The larvae

emerge from hibernation in early spring and bore into the developing buds and laterals. A hymenopterous parasite has been identified as *Horogenes exareolatus*.—Scottish Raspberry Investigation, East Malling Research Station.

1438. MYBURGH, A. C.

An insect pest of olive trees.

Fng S. Afr., 1951, 26: 391-2, illus.

In the western Cape Province both nymphs and adults of the olive tingitid (*Teleonemia australis*) cause serious damage, particularly in sunny still weather, by sucking sap from leaves and reducing tree vitality. A single application of a nicotine spray (e.g. nicotine sulphate 40% diluted 1/500) in early October gives satisfactory control.

A.C.S.

1439. ANON.

Observaciones y ensayos realizados contra el psilido del peral (*Chermes pyricola*).

(Observations on the pear psyllid, *Chermes pyricola*, and experiments on its control.)

Bol. Estac. exp. Cinco Saltos, 1951, 3: 35-6.

Since 1949 the pear psyllid has become a serious pest in Cinco Saltos, Argentina. Control experiments have been carried out with a number of insecticides, the best results being obtained with hexachlorocyclohexane and phosphorus compounds. Winter oil spraying also reduced infestation considerably.

1440. KIRBY, A. H. M.

The chemical control of the apple sawfly.

Ann. appl. Biol., 1951, 38: 899-903, bibl. 15.

Earlier work on the chemical control of apple sawfly (*Hoplocampa testudinea*) is reviewed. Experiments on Worcester Pearmain apple trees in 1950 are described, in which DDT, γ -BHC, chlordane, parathion, toxaphene, aldrin, and dieldrin were compared with the standard nicotine spray. All materials, including nicotine, gave over 90% reduction in an infestation of over 40%, and γ -BHC proved quite as active in the presence of 1% lime-sulphur as without it. The first six treatments were significantly better than nicotine, and parathion and γ -BHC can both be said to have been consistently effective for 3 years. Aldrin and dieldrin are obviously very promising, with toxaphene close behind, but chlordane, which was again effective, offers no obvious advantages and is not commercially available in Britain. The mode of action of these materials, the effect of meteorological and biological factors on the efficiency of sprays, and phototoxicity are discussed. A tentative recommendation would be to spray BHC 1 week after 80% petal-fall, but it must be remembered that the later the spray is put on, the more danger there is of a deleterious effect on red spider predators.—East Malling Research Station.

1441. HOUTMAN, G.

De perezagwesp in 1950. (The pear sawfly in 1950.)

Fruiteelt, 1951, 41: 256-7, illus.

Observations on the pear sawfly (*Hoplocampa brevis*) are recorded for two pear orchards in West Friesland. The times of appearance of the first adult sawfly, the first eggs, the first larvae, and of full flight are tabulated for seven varieties of pear. The activity of

the sawflies during April, May and early June are shown on a graph.

1442. VAN KATWIJK, W.

Beschadiging van appels door le larven van de zuringbladwesp (*Ametastegia glabrata* Fall.) (Injury to apples caused by the dock sawfly.)

Fruiteelt, 1951, 41: 578-9, illus.

Injury to apples by the larvae of the dock sawfly is reported from several parts of the Netherlands in 1950. The life cycle of the sawfly is outlined and the damage caused on apples described.

1443. SOENEN, A.

Les hoplocampes du prunier. (Plum sawflies.)

Fruit belge, 1951, 19: 185-90 and 1952, 20: 9-11, illus.

An account is given of the bionomics and the control of plum sawflies, *Hoplocampa minuta* and *H. flava*. The recommendations for control are: (1) apply the treatment just before the larvae hatch, (2) determine the species causing the damage, since that affects the choice of the preparations to be used, for *H. minuta* either DDT or thiophosphate (E605), for *H. flava* either thiophosphate (E605) or HCH.

1444. O'NEILL, W. J.

DDT and parathion for San José scale control.

J. econ. Ent., 1951, 44: 709-11, being *Sci. Pap. Wash. St. agric. Exp. Stat.* 979.

Results of trials have shown DDT to be very effective when applied at the rate of 2 lb. 50% wettable powder per 100 gal. just prior to the appearance of the crawlers on Italian prunes. It was found, however, somewhat slow in action, and fruit marking may occur before mortality results. Parathion was also found satisfactory and of more rapid action. A combination of the materials is suggested to prevent fruit marking under conditions of severe infestation.

1445. LÜDICKE, M.

Über die Wirkung von Mineralölen auf *Quadraspidiotus perniciosus* (Comst.). (The effect of mineral oil on *Quadraspidiotus perniciosus*.)

Z. PflKrankh., 1951, 58: 259-68, bibl. 24.

This is a study of the physical properties of fruit tree mineral oils, and of the particle size of their emulsions in relation to the control of the San José scale. In combination with other insecticides, such as DNC, an enhanced effect is obtained.

1446. SPILLER, D.

Notes on *Thysanoptera*.

N.Z. J. Sci. Tech. Sec. B, 1951, 33: 2: 142-3, bibl. 2.

This list of thrips occurring in New Zealand includes species found on fruit trees, tobacco, tomato and other vegetables, and ornamental plants.

1447. LIEBERMANN, J.

Acridios enemigos de olivares en Catamarca y La Rioja (Orth. Caelif. Acrid. Cyrtacanth.). (Locust pests of olive trees in Catamarca and La Rioja [Argentina].)

Idia, 1951, 4: 44: 17-20, bibl. 33.

In 1950 a serious attack of locusts, *Dichroplus elongatus* and *D. vittatus*, occurred in the olive plantations of Catamarca, Argentina, and in 1951 a similar attack occurred in La Rioja. This is the first time that *Dichroplus* has been reported a pest of olives in Argentina. The literature on the biology of the two species is reviewed.

Slugs.

(See also 1522, 1862.)

1448. CHAUMIER, P.

Le tue-limace Bihorel. (The Bihorel slug-killer.)

Rev. hort. Paris, 1951, 123: 598.

A grower has found that the use of pea flour instead of bran in slug baits considerably increases the activity of metaldehyde.

1449. FRÖMMING, E.

Ein bisher wenig beachteter Vorratsschädling, die Nacktschnecke *Limax flavus* L. (A hitherto rare storage pest, the slug *Limax flavus* L.)

Z. PflKrankh., 1951, 58: 322-6, bibl. 15.

The Yellow slug, *Limax flavus*, is here described with reference to its ravages on stored products, including a number of vegetables and certain fruits (apple, pear, strawberry).

Other pests.

(See also 1127.)

1450. HOWARD, W. E., AND HJERSMAN, H. A.
Deer repellents.

Calif. Agric., 1951, 5: 9: 7, illus.

Four deer repellents, Diamond L Brand, Good-rite z.i.p., Mapco, and Mapco plus adhesive, were sprayed more often and in stronger concentrations than recommended by the makers onto a range of 2-year-old pome and stone fruit trees just starting to come into leaf without noticeable injury to the foliage.

1451. WHIFFIN, H. J.

Rabbit damage; what precautions to take.

Fruitgrower, 1952, No. 2923, pp. 12-13, illus.

Various paints were found ineffective against rabbits damaging fruit trees. The only satisfactory remedy is afforded by guards of 42-in. high, 18-gauge, wire netting, which can be easily removed for cultivation and mulching. Completely girdled trees can be saved by bridge grafting, but this is uneconomic for newly planted trees.

Biological control.

(See also 1310, 14850, 1821-1825, 1859.)

1452. GRIOT, M.

La lucha biológica contra el bicho de cesto y la posibilidad de su empleo. (Possibilities of biological control for the bag-worm [*Oiketicus kirbyi*].)

Cien. y Invest., 1951, 7: 195-202, bibl. 7, illus.

Work is reviewed on the biological control of *Oiketicus kirbyi*, a moth attacking a wide range of plants,

especially fruit trees. There are numerous natural parasites in Argentina but only 3 are considered suitable for use in commercial control, i.e. *Plagiotachina caridei*, *Balcarcia bergi* and *Psychodsmicra brasiliensis*.

1453. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Praying mantids (*Mantidae*).

Agric. Gaz. N.S.W., 1951, 62: 423-4, 434, illus.

About 80 species of this family of beneficial insects occur in Australia. They feed upon various injurious insects such as flies, moths, grasshoppers, etc., and neither they nor their egg capsules should be destroyed. Two of the larger species most frequently observed are the slender green mantid, *Tenodera australasiae*, which is $3\frac{1}{2}$ in. long, and the more thickest brown species, *Archimantis latistylus*, 4 in. long. Another species, not uncommon, is the broad-shouldered mantid, *Orthodera ministralis*, a light green insect which measures about $1\frac{1}{2}$ inches in length.

Antibiotics and sources thereof.

(See also 1353-1356, 1550.)

1454. NIEMAN, C.
Antibiotica, afkomstig uit het hogere plantenrijk. (Antibiotics from the higher plants.)

Chem. Wbl., 1951, 47: 192-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 302.

Notes are given on the antibiotics tomatine, lupulon, humulon and gossypol. Antibiotics from kohlrabi and banana skins are being studied.

1455. ABDULAeva, A. A.
The antibiotic properties of *Gleditschia* fruits. [Russian.]
Priroda, 1951, 40: 9: 52-3.

An investigation is described into the antibiotic properties of plants of the Tashkent oasis. Of special interest in this connexion were the volatile fractions and the juices of the fruits of *Gleditschia triacanthus*, *G. inermis*, and *G. japonica* as possessing marked antibiotic properties towards many organisms, mostly bacteria. The fungus *Penicillium glaucum* was found to be particularly susceptible.

1456. HERZ, W., PATES, A. L., AND MADSEN, G. C.
The antimicrobial principle of *Clematis discoreifolia*.

Science, 1951, 114: 206, bibl. 4.

Freshly prepared aqueous extracts of *Clematis discoreifolia* showed unusually strong activity against gram-positive and gram-negative bacteria. This was maintained for more than 2 months when the extracts were stored in a refrigerator but rapidly decreased at room temperature. Extracts from dried leaves were inactive.

1457. KERR, R. W.
Adjuvants for pyrethrins in fly sprays.
Bull. C.S.I.R.O. Aust. 261, 1951, pp. 63, bibls. 24, 15 and 7.

In Part 1 of this paper the adjuvant action of some essential oils and of other materials derived from Australian plants is considered. Of these the following significantly increased the toxicity of the standard

spray: essential oils distilled from the leaves of *Backhousia myrtifolia*, *Doryphora sassafras*, *Melaleuca bracteata* and *Zieria smithii*; essential oils steam-distilled from the wood of *Dacrydium franklinii* and *Eremophila mitchelli*; elemicin, methyl eugenol and evodionol.

1458. ARK, P. A., AND OSWALD, J. W.
Antibiotic potentialities of some strains of *Streptomyces scabies*.
Phytopathology, 1951, 41: 1034.

Some strains of *Streptomyces scabies* (potato common scab organism) showed strong antibiotic action against *Verticillium albo-atrum* and *Fusarium oxysporum*.—Univ. of Calif.

1459. CERCÓS, A. P.
Actividad antimicrobiana de la vinalina, alcaloide del vinal (*Prosopis ruscifolia* Griseb.). (The antimicrobial activity of vinalin, an alkaloid from *Prosopis ruscifolia*.) [English summary $\frac{1}{2}$ p.]
Rev. argent. Agron. B. Aires, 1951, 18: 200-9, bibl. 12.

It was found that the substance responsible for the antibacterial effects of extracts of *Prosopis ruscifolia* was an alkaloid, called vinalin. Fungi were less sensitive to vinalin than were bacteria, but *Ustilago maydis* and *Botrytis cinerea* were very susceptible. The chemical and physical properties of vinalin were determined.

1460. WARREN, J. R., GRAHAM, F., AND GALE, G.
Dominance of an actinomycete in a soil microflora after 2,4-D treatment of plants.
Phytopathology, 1951, 41: 1037-9, bibl. 1, illus.

An actinomycete with antibiotic properties was isolated from soil in which tomato plants had been grown and sprayed with 2,4-D. It was found to be antibiotic towards a number of plant pathogenic fungi, e.g. *Rhizoctonia solani*, *Sclerotinia cinerea*, *Sclerotium rolfsii*, *Alternaria solani*, and *Venturia inaequalis*.—Duke Univ., Durham, N.C.

1461. WILSON, G. B., AND BOWEN, C. C.
Cytological effects of some more antibiotics.
J. Hered., 1951, 42: 251-5, bibl. 13, illus.

In the first paper of this series [see *H.A.*, 21: 2512] the cytological and other effects of 7 antibiotics on *Allium* root tips were reported. This paper is concerned with the effects of a further 4 antibiotics, aureomycin, terramycin, streptomycin and chloromycetin. All 4 were found capable of inducing mitotic aberrations superficially similar to c-mitosis. With the exception of chloromycetin, the cytological and toxicity thresholds were so close that recovery of altered cells seemed unlikely. None seemed likely to induce polyploidy or other permanent changes in great numbers.

1462. WRIGHT, J. M.
Phytotoxic effects of some antibiotics.
Ann. Bot. Lond., 1951, 15: 493-9, bibl. 17.

The toxicity of 12 natural antibiotics, 1 derivative of a natural antibiotic, and 2 synthetic inhibitors, coumarin and 3-indolylacetic acid, to wheat, clover and mustard seedlings was assessed by a simple germination test.

Fungicides.

1463. ANON.

SR-406: un nuevo y poderoso fungicida norteamericano. (SR-406: a new and potent North American fungicide.)

Suelo Tico, 1951, 5: 13-15, reprinted from *The Lamp*.

A popular account of the discovery by the Standard Oil Development Co., N.J., and of the probable uses of SR-406, a new petroleum fungicide. It has been tested with good results on diseases of fruit trees, vegetables and tropical crops. Although not yet in commercial use, it promises to be the most universal fungicide yet discovered.

1464. GOLDSWORTHY, M. C., AND GERTLER, S. I.
Fungicidal and phytotoxic properties of 412 synthetic organic compounds.

Plant Dis. Repr., 1951, *Suppl.* 205, pp. 176-289.

In a continuation of their laboratory tests against conidia of *Monilinia fructicola* and *Glomerella cingulata* (H.A., 20: 752) the authors tested 412 more synthetic organic compounds. Of these, 24 showed fungicidal properties, but only 5 appeared promising enough to warrant orchard tests.

Insecticides.

(See also 1485d, e, f, i, j, n, o, s.)

1465. CUILLE, J., AND GABRIEL, G.

Tests biologiques permettant le contrôle de l'efficacité des traitements insecticides. (Biological tests for determining the effectiveness of insecticidal treatments.)

Fruits d'Outre Mer, 1951, 6: 327-33, bibl. 27, illus.

The techniques employed in the laboratories of the Institut des Fruits et Agrumes Coloniaux (I.F.A.C.) are described with a number of practical examples relating to such plants as the sour orange and pineapple.

1466. JANCKE, O.

Beiträge zur innertherapeutischen Schädlingsbekämpfung III. (Inner therapy methods for pest control.)

Z. PflKrankh., 1951, 58: 179-85, bibl. 6, illus.

The author enumerates the general properties that substances used for inner therapy should possess, and then outlines the results of his own work with such substances for the control of aphids and scale insects.

1467. DE ONG, E. R.

Refined petroleum oil as an insecticide.

World Crops, 1951, 3: 19-22, bibl. 2, illus.

A review of progress in the U.S.A. with particular reference to its use against fruit tree pests.

1468. STUBBINGS, W. A. K., AND NEL, R. I.

The use of some recently developed synthetic organic insecticides against pests of pear and apple trees in the Western Cape Province of South Africa.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 413-16.

Spray programmes based on the use of wettable DDT formulations gave very satisfactory results against codling moth. DN III, an amide salt of dinitro-ortho-cyclo-hexyl-phenol, and parathion were very effective against orchard mites. Thiophos, a wettable powder containing 15% parathion, gave excellent control of heavy infestations of woolly aphis, *Eriosoma lanigerum*. The problem of toxicity of these insecticides to beneficial insects is discussed briefly.

1469. HOLMES, E.

Taint-free use of BHC.

Agric. Chemls, 1951, 6: 12: 31-3, 113, 115, bibl. 4.

While BHC must not be sprayed or dusted on black currants under any circumstances, trials in England have shown that a spray programme consisting of 4 applications of 50% BHC containing a minimum of 13% γ -BHC controlled a wide range of top fruit pests without affecting the flavour of the fruits. Potatoes should not be planted in soil treated with BHC for wireworm control within 2 or 3 years of the application. The material can, however, be applied to tomatoes, onions and mushrooms without causing off-flavour.

1470. WEINMAN, C. J., AND MOORE, T. E.

Field tests on new acaricides in 1950.

Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 60-72.

As the result of DDT applications, orchards in Illinois were found to be heavily infested by mites—usually 2-spotted mites and European red mites. Several of the 8 proprietary materials tested showed promise of giving adequate control without plant injury and probably without special hazard to human beings.

1471. HEY, G. L., AND MITCHELL, A. H.

Some experiences with parathion on a field scale in 1949.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 203-6.

Ten of the more important pests or groups of pest on which observations were made in orchards, hop gardens and glasshouses in England are listed.

1472. CUILLE, J.

Effet de synergisme obtenu lors de la dégradation du mélange de chlordane et de parathion. (A synergistic effect obtained during the decomposition of a mixture of chlordane and parathion.)

Fruits d'Outre Mer, 1951, 6: 99-103, bibl. 14.

A trial is described in which it would appear that the decomposition of parathion was prevented by the presence of chlordane in the solution.

Spray apparatus and technique.

(See also 1485v.)

1473. CROSBIE, C. J.

Low-volume sprayers.

N.Z. J. Agric., 1951, 83: 173-82, 289-95, illus.

This article is in two parts, the first dealing with "principle and components", the second with "construction and operation". The sprayers are described

chiefly in connexion with the application of weed-killers to field crops, but it is stated that an efficient sprayer for disease control in orchards on small trees or fruit canes can be built cheaply on the same lines and, when fitted with the correct nozzles, will make efficient use of modern sprays that are true solutions.

1474. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

The Willet and Robinson dust gun.

[Publ.] *Nat. Inst. agric. Engng C.S.* 8/1178, 1951, pp. 13, illus.

This hand-operated gun [not as yet on sale] was originally intended for the disinfection of buildings. In its present form it would appear most useful for indoor crops such as those in a small glasshouse. Many improvements could profitably be made and are suggested.

1475. STAPLEY, J. H.

A new technique low-volume spraying of top fruit.

Fruitgrower, 1951, No. 2919, pp. 981-2, illus.

In preliminary trials on Bramley Seedlings, using low-volume applications throughout the spraying programme, complete protection from aphids, winter moth and tortrix caterpillars was obtained. Scab control, while inadequate, was in no way inferior to that obtained by the conventional method of application.

1476. BURRELL, A. B.

Another season's experience with concentrate spraying.

Amer. Fruit Gr., 1952, 72: 2: 18, 50-2, illus.

Accumulating evidence from experiments and growers' experiences in New York shows that substantial labour saving and increased speed are possible with semi-concentrate and concentrate spraying, provided the machine used is sufficiently powerful.

1477. VAN OOSTEN, A., AND OTHERS.

Enkele praktijkervaringen met de nevelsprit in Zeeland. (Field trials with mist sprays in Zeeland.)

BESEMER, A. F. H.

Twee jaar vernevelen in de fruitteelt. (Two years' trials of mist sprays in orchards.)
Fruitteelt, 1951, 41: 4-6, 7-9.

These are accounts of trials with mist, "atomized", or low-volume dosage sprays in Netherland orchards. Good results are mentioned against scab (*Venturia*) and certain insect pests.

1478. ENGLISH, H., AND WILSON, E. E.

Low-volume sprays for peach diseases.

From abstr. in *Phytopathology*, 1951, 41: 938.

In trials for the control of coryneum blight and leaf curl in peaches it was found that, when equivalent amounts of copper were applied per acre, copper deposits obtained on twigs with air-blast applications of basic copper sulphate plus an oil adhesive were as high as, or higher than, those obtained with the same

materials or bordeaux mixture applied with a hydraulic sprayer. The control of leaf curl and coryneum blight obtained with air-blast applications of either basic copper sulphate or bordeaux mixture was as effective as that obtained with the same materials applied as dilute hydraulic sprays.

Spray damage and residues.

1479. LOUW, A. J.

The problem of spray damage in fruit disease control in the Western Cape Province.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 260-2.

Cover sprays used against the important fungus diseases apple and pear scab, *Venturia inaequalis* and *V. pirina*, and peach mildew, *Oidium leucoconium*, and the damage caused by them are enumerated. The possibility of developing eradicant fungicides for dormant treatment, so as to obviate the necessity for cover sprays during the growing season, is discussed.

1480. LOEWEL, E. L.

Erfahrungen mit der Bieneneinwanderung 1951 im niederelbischen Obstanbaugbiet. (Experiences with bee migration in 1951 in the Lower Elbe fruit growing area.)

NachrBl. dtisch. PflSchDienst., Braunschweig, 1951, 3: 133-4.

No serious damage was caused to bees by the spray materials applied during blossoming.

1481. SCHWABEL, F. X., AND OBERMAYER, G.

Nachweis von kupferhaltigem Spritzbelag auf Pflanzen. (The determination of copper-containing spray coverage on plants.)

NachrBl. dtisch. PflSchDienst., Braunschweig, 1951, 3: 167-8, illus.

A method of taking imprints of sprayed leaves, on filter papers treated with two different types of reagents, is described.

1482. GIANG, P. A., AND HALL, S. A.

Enzymatic determination of organic phosphorus insecticides.

Analyt. Chem., 1951, 23: 1830-4, bibl. 7.

A new sensitive method for the detection of spray residues on plants is described.

1483. SCHAEFER, L.

Sur la retention de l'acide cyanhydrique par les fruits soumis a la désinfection. Troisième partie. (The retention of hydrocyanic acid by fruits submitted to fumigation. III.)

Ann. Épiphyt., 1950, 1 (n.s.): 286-92.

Results are recorded for the amount of HCN retained on chestnuts submitted to various concentrations and times of fumigation.

1484. GOULD, E., AND HAMSTEAD, E. O.

The toxicity of cumulative spray residues in soil.

J. econ. Ent., 1951, 44: 713-17, illus., being *Sci. Pap. W. Va agric. Exp. Stat.* 441.

As a means of studying the possible toxicity of spray residues in soil, preliminary experiments were started in West Virginia in 1948 to determine the effect of various insecticides, fungicides and other materials on plant and animal life when applied directly to the soil. The work was carried out on apples and peaches and the chemicals were applied in normal, 10×normal, and 30×normal concentrations. The most significant results, clearly apparent to date, of the 10×benzene hexachloride treatments in particular were increased tree vigour, elimination of cover crop and control of woolly aphids on the roots of established apple trees.

Noted.

1485.

- a BAINES, R. C.
Citrus-root nematodes [*Tylenchulus semi-penetrans*] on olive.
Calif. Agric., 1951, 5: 10: 11.
See also *Phytopathology*, 40: 963; *H.A.*, 21: 431b.
- b DAME, F.
Zum Vorkommen des Walnuss-Bakterienbrandes, verursacht durch *Pseudomonas juglandis* Pierce. (The occurrence of walnut blight caused by *Pseudomonas juglandis* [in Western Germany].)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 164, bibl. 5, illus.
- c EAST AFRICA HIGH COMMISSION.
Report of the Desert Locust Survey, 1st October, 1948–30th September, 1950.
Govt. Printer, Nairobi, Kenya, 1951, pp. 4, 2 maps.
- d EATON, J. K.
A review of recent research on synthetic acaricides.
Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 119-24, bibl. 10.
- e EMERY, G. A.
Improvements in DDT spraying.
World Crops, 1951, 3: 433-5, bibl. 3, illus.
- f FALES, J. H., AND STOUT, O. O.
Aerosol tests against the Oriental fruit fly and other insects.
J. econ. Ent., 1951, 44: 608-10, bibl. 6.
In aircraft testing rooms and Peet-Grady chamber.
- g FRIEDRICH, G.
Möglichkeiten zur Verbesserung des obstbaulichen Pflanzenschutzes durch Vorherbestimmung des zu erwartenden Schädlingbefalles. (The possible improvement of plant protection of fruit trees by forecasting pest and disease incidence.)
Reprinted from *Querschnitt durch den neuen Gartenbau (Aspects of modern horticulture)*, Deutscher Bauernverlag Berlin, pp. 23, bibl. 14 [undated, received 1951].
- h HAMILTON, D. W., AND OTHERS.
Summary of recent developments in the control of insects and mites attacking apples and peaches.
Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 99-102.
- i HOLZ, W.
Methoden zur Prüfung von Pflanzenschutz- und Vorratsschutzmitteln XLVI. Eine neue Apparatur zur Prüfung flüchtiger Insektizide (DDT, Hexa, Phosphorester u.a.). (Methods for testing plant- and stored produce protecting chemicals XLVI. A new apparatus for testing volatile insecticides (DDT, hexa, phosphoric ester, etc.).)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 129-32, bibl. 8, illus.
- j VAN DER LAAN, P. A.
A note about the differences between derris and lonchocarpus as an insecticide.
Indones. J. nat. Sci., 1951, 107: 99-101, bibl. 14.
- k MALLINJOUD, H.-M.
Précisions sur le cycle évolutif du puceron farineux du pêcher et du prunier "*Hyalopterus pruni*" et nouvelles suggestions relatives à la lutte contre ce parasite. (Observations on the life cycle of the mealy aphid of peach and plum, *Hyalopterus pruni*, and new suggestions concerning its control.)
Rev. hort. Paris, 1952, 124: 622-3, bibl. 1.
- l PARKER, K. G., AND COCHRAN, L. C.
Similarities of symptoms produced by the viruses causing ring spot of peach and necrotic ring spot of sour and sweet cherry. From abstr. in *Phytopathology*, 1951, 41: 942.
- m PETTINARI, C.
Una fusariosi su radici di *Opuntia ficus-indica*. (A root rot of *O. ficus-indica* caused by *F. oxysporum* var. *opuntianum*.) [English summary 10 lines.]
Ann. Sper. agrar., 1951, 5: 1415-21, bibl. 5. Apparently first recorded instance.
- n PRINCI, F.
Toxicology and hazard record of the newer pesticides.
Agric. Chemls, 1952, 7: 1: 44-5, 47, 97, 99, 101, 103.
- o RIPPER, W. E., GREENSLADE, R. M., AND HARTLEY, G. S.
Selective insecticides and biological control.
J. econ. Ent., 1951, 44: 448-59, bibl. 25, illus.
Review mainly of work carried out at Pest Control Ltd., Cambridge.
- p DE ROPP, R. S.
The crown-gall problem.
Bot. Rev., 1951, 17: 629-70, bibl. 161.
A review.

- q ULLRICH, H., AND MÄDE, A.
Studien über die Ursachen der Frost-resistenz. II. Untersuchungen über den Temperaturverlauf beim Gefrieren von Blättern und Vergleichsobjekten. (Studies on the causes of frost resistance. II. Investigations on the temperature curve in leaves and comparable control objects on freezing.)
Planta, 1940, 31: 251-62, bibl. 12 [received 1951].
Plectranthus fruticosus was used as a test plant.
- r UVAROV, B. P.
Locust research and control 1929-1950.
Colon. Res. Publ. 10, 1951, London, H.M.S.O., pp. 67.
- s VIEL, G., AND CHANCOGNE, M.
Étude des actions ovicides. I. Technique d'essais. (Ovicidal action. I. Testing technique.)
Ann. Épiphyt., 1950, 1(n.s.): 293-306, bibl. 14, illus.
Observations on eggs of *Ephestia kühniella*, *Operophtera brumata* and *Aphis pomi*.
- t WOLFE, H. R., ANTHON, E. W., AND JONES, L. S.
Insect transmission of Western X-disease of peaches.
Science, 1951, 113: 558-9, bibl. 8.
See *H.A.*, 21: 2444.
- u WOLFE, H. R., AND OTHERS.
Leafhopper transmission of Western X-disease.
J. econ. Ent., 1951, 44: 616-19, bibl. 10, being *Sci. Pap. Wash. St. agric. Exp. Stat.* 1004.
See *H.A.*, 21: 2444.
- v YOUNG, H. C., CUTRIGHT, C. R., AND WINTER, H. F.
How to use a concentrate orchard sprayer.
Trans. Ill. St. hort. Soc. for 1950, 1951, pp. 156-60.
- w ZILLIG, H.
Auftreten der Rebfeinde in den deutschen Weinbaugebieten im Jahre 1950. (The incidence of vine pests and diseases in Germany in 1950.)
Reprinted from *Rheinische Weintztg*, 1951, 1: 6-8, and *Rheingauer Weintztg*, 1951, 37: 254-6.

WEEDS AND WEED CONTROL.

Weeds and poisonous plants.

(See also 2027.)

1486. PAUZÉ, F.
La propagation des mauvaises herbes. (The propagation of weeds.)
Rev. d'Oka, 1951, 25: 125-31, 173-6, 177-88.
As a preliminary to reviewing cultural methods of weed control, the author makes a detailed classification of the ways in which weeds are propagated.
1487. DOLIVO, A.
Plantes toxiques de chez nous. (Poisonous plants of Switzerland.)
Rev. hort. suisse, 1951, 24: 301-8, bibl. 4.
A list is given of all the wild or commonly cultivated plants of Switzerland (over 100 species) which are toxic to human beings either when consumed, inhaled or touched. The poisonous part of the plant, the toxic principle, the effect and the treatment recommended are tabulated.
1488. GRIGSBY, B. H.
The use of chlordane for the control of crabgrass. (A preliminary report.)
Quart. Bull. Mich. agric. Exp. Stat., 1951, 34: 158-61, bibl. 1.
1. Applications of 5 to 25 pounds chlordane per acre to soil in which crabgrass seeds were germinating reduced the emergence of crabgrass seedlings. 2. Foliage applications of 5 to 10 pounds chlordane per acre in a refined oil carrier gave a rapid kill of crabgrass without injury to lawn grass. 3. Crabgrass plants can be killed at any stage of growth by the mixture. 4. Bent grasses appear to be tolerant of the oil-chlordane mixture. 5. Chickweed can be killed about as readily

as crabgrass with chlordane in oil. [Author's summary.]

1489. THIMANN, K. V.
The use of 2,4-D against a woody tropical weed.
Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 433-7, bibl. 6.
In Cuba, 2,4-D applied to cut stumps and basal growth, was found to be the most economical means of restricting and partially destroying marabu, *Dichrostachys nutans*. [See also *H.A.*, 20: 1593 and 21: 1603y.]

Herbicides.

(See also 1709.)

1490. THORUP, S.
Laboratorieforsøg med hormonpræparater til ukrudtsbekæmpelse. (Laboratory trials with hormone herbicides for weed control.) [English summary 3½ pp.]
Tidsskr. Planteavl, 1951, 54: 553-627, bibl. 26, being *Beretn. Statens Forsøgsvirks. Planteukult.* 441.
This bulletin summarizes the more important results obtained at the Danish Weed Research Station from 1 April, 1946 to the end of 1948 under the following headings: (1) the biological assay of the active principle in hormone herbicides; (2) the cleaning of experimental instruments and sprayers; (3) the germination of seeds from treated plants; (4) the germinating capacity of seeds treated with hormone herbicides; (5) the effect of hormone herbicides on certain perennial weeds; (6) the effect of soil and weather on the action

of hormone herbicides; (7) the persistence of the inhibiting action of hormone herbicides in the soil.

1491. KRUG, H. P.

Algunos aspectos en la aplicación de los herbicidas modernos. (Some aspects of the use of modern herbicides.)

Agric. trop. Bogotá, 1951, 7: 12: 13-19.

These notes include mention of a successful experiment carried out in Brazil on the use of methyl bromide to control weeds prior to planting eucalyptus.

1492. HOLLY, K.

The use of synthetic growth-regulating substances for selective control of perennial weeds.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 207-12, bibl. 17.

The three primary factors, namely plant, chemical and environment, which have been found to affect the response of any perennial weed, are discussed.

1493. VAN OVERBEEK, J., BLONDEAU, R., AND HORNE, V.

Difference in activity between 2,4-dichlorophenoxyacetic acid and other auxins, and its significance in herbicidal action.

Plant Physiol., 1951, 26: 687-96, bibl. 29.

Tests with etiolated pea stems showed that 2,4-D differs from other, non-herbicidal auxins in its very high activity, the difference being quantitative rather than qualitative. Data available in the literature suggest that the phytocidal effects are the result of metabolic changes brought about by this auxin activity. Abnormally high auxin activity might lead to abnormal accumulations of metabolites, such as coumarin derivatives. One of these coumarin derivatives, β -methyl umbelliferone, has been shown to be more toxic to broad leaved plants than to grasses. Thus a 2,4-D induced accumulation of metabolites might explain both the phytotoxicity and the selectivity of this auxin herbicide.—Shell Oil Co., Modesto, Calif.

1494. MULLISON, W. R.

The relative herbicidal effectiveness of several derivatives of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid.

Plant Physiol., 1951, 26: 773-7, bibl. 12.

From a series of tests on bean and tomato plants made by the Dow Chemical Company, Michigan, it is concluded that 2,4,5-T is more active on beans than 2,4-D, but that there is little difference in activity on tomatoes. The herbicidal activities of both 2,4-D and 2,4,5-T derivatives were ranked as follows: isopropyl esters > alkanolamine salts > acids > ammonium, sodium and calcium salts.

1495. AUDUS, L. J.

The biological detoxication of hormone herbicides in soil.

Plant and Soil, 1951, 3: 170-92, bibl. 18.

"The results of experiments on the continuous perfusion of aerated solutions of the herbicides 2,4-dichlorophenoxyacetic acid (2,4-D), 2-methyl-4-chlorophenoxyacetic acid (MCPA) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) through garden soil indicate that the kinetics of their breakdown are essentially similar. Three phases can be distinguished: (a) an immediate

initial adsorption onto soil colloids amounting to 0.167 ± 0.035 mg. per g. dry soil, (b) a lag phase of varying duration in which there is little or no disappearance of herbicide, (c) a final phase of rapid complete detoxication. Such 'enriched' soils detoxicate subsequent perfusions with the same herbicide molecule at a constant high rate. Enrichment times for 2,4-D, MCPA and 2,4,5-T are roughly of the order of 14, 70 and 270 days respectively." This indication of bacterial action being responsible for detoxication was supported by tests in which detoxication did not take place when a bacterial poison, sodium azide, was added to the soil. The organism responsible for decomposing 2,4-D is found to belong to the *Bacterium globiforme* group.

1496. ATKINSON, J. D.

Injury to grapes from hormone weedkiller.

N.Z. J. Agric., 1951, 83: 389-90, bibl. 6, illus.

After a short review of published work on injury to vines caused by 2,4-D vapour, the author describes his own observations. Reports from the field suggested that the hormone vapour had damaged grapes at a considerable distance, so experiments were carried out to ascertain what the effect was. The striking results obtained—cupped and fringed leaves—are described and the abnormal leaves are illustrated.

1497. YOUNG, H. C., AND CARROLL, J. C.

The decomposition of pentachlorophenol when applied as a residual pre-emergence herbicide.

Agron. J., 1951, 43: 504-7, bibl. 16.

The results of pot experiments in Ohio indicate that the herbicide pentachlorophenol decomposes more rapidly in soils of high than in those of low organic content. The rate of decomposition was most rapid when the moisture content of the soil was near the moisture equivalent and when the soil temperature approached the optimum for microbiological activity. Leaching did not appear to be an important factor in the disappearance of pentachlorophenol when it was used as a pre-emergence herbicide. Under optimum conditions of soil moisture about 10% of the herbicide applied was recovered after 7 weeks. This indicates that there is some risk in using the material as a pre-emergence spray, although tomato, beet, maize, bean and carrot seed, sown in soil containing 20-30% of the amount of herbicide applied for weed control, germinated and emerged normally.

1498. ANON.

New weed killer can "erase" dense growth.

Seed World, 1951, 69: 9: 45.

In extensive tests a non-selective herbicide known as CMU (3-(p-chlorophenyl)-1,1-dimethylurea), developed by the Du Pont company, has given excellent control of many perennial weeds, including Bermuda grass, quack grass, Johnson grass and bindweed, as well as most annual weeds.

Noted.

1499.

a COCK, R. E.

Blackberry control.

Tasm. J. Agric., 1951, 22: 332-5, illus.

Spraying with 2,4,5-T is recommended.

- b McNAMARA, J. J.
Chemical control of brush.
Calif. Agric., 1951, 5: 7: 5, 11.
Coyote brush, *Baccharis pilularis*, with
2,4-D.

- c PETERSEN, H. I.
Arsoversigt for Statens Ukrudtsforsøg 1949.
(Annual Report of the Danish Institute for
Weed Research for 1949.) [English sum-
mary 1½ pp.]
Tidsskr. Planteavl, 1951, 54: 336-42.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 1172, 1180, 1191, 1254, 1256, 1446, 1987, 2001,
2002, 2006, 2007, 2010, 2016, 2018, 2025, 2027, 2028.)

1500. FLEISCHMANN, C.

Der Gemüsebau in Wiesmoor. (Vegetable
growing in Wiesmoor.)

Höfchen Briefe, 1951, 4: 179-88, illus.

A popular description is given of the largest glasshouse
vegetable producing concern in Western Germany.
Cucumbers, some 2½ million a year, and tomatoes,
500,000 lb., are the main crops, and appreciable
quantities of kohlrabi, beans and melons are grown as
subsidiary crops. Apart from the recognized modern
cultural methods, artificial illumination is used for
raising cucumber seedlings and some tomatoes are
grown in soilless culture.

1501. DE VALKENEEER, A.

Centre d'essais de cultures maraîchères et
vivrières à Kinjama en territoire de Sakania.
(The vegetable and food crop experimental
centre at Kinjama, Sakania.)

Bull. centr. Ét. Probl. Soc. Indigènes, 1950,
13: 82-97, from abstr. in *DocumBl. trop.*
Prod. Amst., 1951, 6: 472.

The possibility of establishing a vegetable and food crop
industry in Kinjama, in the Belgian Congo, is con-
sidered.

1502. JACKS, H.

Seed disinfection. I. Preliminary selection
of vegetable-seed protectants.

N.Z. J. Sci. Tech. Sec. A, 1951, 33: 3: 27-38,
bibl. 5, illus.

Out of 28 fungicides tested in glasshouse and field trials,
Cuprocid, Spergon, Panogen, TMTD, FDD, Dow 9B,
and 36L, were the more promising. The efficiency of
protectants was more marked for peas than for lettuces.
Isolations from seed and seedlings recovered from the
soil indicated that *Pythium*, *Rhizoctonia* and *Fusarium*
were the fungi mainly responsible for damping-off.—
D.S.I.R., Auckland, N.Z.

1503. WILLCOX, O. W.

Quantitative agrobiologic evaluation of some
phosphate fertilizer tests with vegetable
crops in Alabama.

Agron. J., 1951, 43: 83-90, bibl. 12.

Mitscherlich's law relating to yield and fertilizer
applications is found to work with two kinds of soil in
Alabama but not for a third. The author believes that
this law gives the correct approach to fertilizer investiga-
tions and that statistical methods are valueless. S.C.P.

1504. TWYMAN, E. S.

The iron and manganese requirements of
plants.

New Phytol., 1951, 50: 210-26, bibl. 18.

The iron and manganese requirements of oat, lettuce
and tomato are discussed under: (a) Iron and man-
ganes supplies and yield. (b) The visual symptoms of
nutritional status and the Fe/Mn ratio in the substrate
and in the tissues. (c) The iron and manganese
content of the tissues at various levels of supply.
(d) The visual symptoms of nutritional status and the
iron and manganese content of the tissues. The rate
of entry of iron in relation to the development of iron
deficiency is important in the accumulation of inactive
iron.—Birmingham Univ.

1505. DELVER, P.

De oorzaken van mangaanhonger bij groen-
tegewassen op veengrond. (Causes of
manganese-deficiency in market crops on
peat soils.) [English summary 10 lines.]
Meded. Dir. Tuinb., 1951, 14: 414-24.

Chlorosis due to Mn-deficiency is noticeable in market
crops grown on peat soils in the Gloterpolder, near
Amsterdam, particularly in crops grown under Dutch
lights, such as cucumbers, lettuce, cauliflowers, spinach
and endive. The symptoms are most frequently
noticed on soils with a pH above 6 and this is con-
sidered to be due, not to overliming, but to excessive
applications of horse manure, for it is assumed that the
decomposition of such large quantities eventually
raises the pH. It seems that manganese-fixation by
bacteria is particularly enhanced by these conditions.

1506. LÖHNIS, M. P.

Manganese toxicity in field and market
garden crops.

Plant and Soil, 1951, 3: 193-222, bibl. 25.

In these culture tests over several years at Wageningen
the bean, *Phaseolus vulgaris*, was seriously affected by
excess manganese in unlimed or sparsely limed plots.
In healthy young leaves in these plots the Mn value
ranged from 40 to 940 p.p.m., in affected leaves from
1,104 to 4,261 p.p.m. Flax, potatoes, tobacco,
mustard, oats, and strawberry appeared tolerant to
excess in the field plots. Peas, *Vicia faba* and vine
appeared insensitive in culture solutions, while lettuce
showed slight injury in the presence of a large dose of
MnSO₄. A comparison of the Mn content of the
foliage suggests that tolerance to Mn may be due
either to weak absorption or a strong tolerance within
the plant. The high sensitiveness of beans may be due
to a very strong absorption. *Phaseolus vulgaris* would
appear to afford a good test organism for soil tests
of Mn excess.

1507. MULDER, E. G.

Importance of molybdenum in the nitrogen
metabolism of micro-organisms and higher
plants.

Plant and Soil, 1948, 1: 94-119, bibl. 30,
illus.

Molybdenum proved indispensable for nitrate reduction in tomato plants and for full nitrogen fixation in pea root nodules.

1508. WHITE, W. H., AND DOOLITTLE, S. P.
Vegetable gardeners' handbook on insects and diseases.
Misc. Publ. U.S. Dep. Agric. 605, revised 1951, pp. 30, illus.

A further revision of a useful, practical manual issued first as *Misc. Publ.* 525 and noted briefly *H.A.*, 14: 1109 and 17: 186.

1509. BRIJËR, C. J. (Editor).
 Overzicht van de belangrijkste ziekten en plagen van landbouwgewassen en hun bestrijding. (A summary of the most important diseases and pests of agricultural crops and their control.)
Meded. PlZiekt. Dienst 92, 8th Imp., 1952, pp. 175, illus.

This profusely illustrated brochure is devoted to field crops, but as some of these are also grown as garden vegetables—potatoes, beet, peas, beans, and roots—it will serve for reference in such cases.

1510. NEERGAARD, P., AND NEWHALL, A. G.
 Notes on the physiology and pathogenicity of *Centrospora acerina* (Hartig) Newhall.
Phytopathology, 1951, 41: 1021-33, bibl. 17, illus.

Infection experiments with *Centrospora acerina*, a fungus which now occurs in most European and North American countries, show it to be an extremely polyphagous parasite with host plants as unrelated as *Allium cepa*, *Brassica oleracea*, *Daucus carota*, *Dianthus caryophyllus*, *Godeitia hybrida*, *Lactuca sativa*, *Lycopersicon esculentum*, and *Primula malacoides*.—Enke Laboratory, Copenhagen, and Cornell Univ., N.Y.

1511. CONROY, R. J.
 The use of soil fumigants for root knot control.
Agric. Gaz. N.S.W., 1951, 62: 411-14, bibl. 6, illus.

Root knot or root gall, caused by the eelworm *Heterodera marioni*, is a serious disease of many crop plants in New South Wales including vegetables, ornamental plants and fruit trees. It can be controlled by the soil fumigants D-D and chloropicrin. D-D at the rate of 20 gal. per acre gave more effective control than chloropicrin at 42 gal. per acre in one experiment and slightly better control in another. Neither fumigant, at the dosage used, completely eradicated the eelworms, but the commercial life of the plants in treated tomato plots was greatly improved. Although chloropicrin is not as nematocidal as D-D it is effective against certain fungous diseases such as fusarium wilt, and can be used where a dual-purpose fumigant is required.

1512. HEELEY, W.
 D-D—a soil fumigant against *Heterodera marioni* in the United Kingdom.
Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 193-202, bibl. 5.

On the basis of trials conducted in 1947 and 1948, soil injection of D-D at the rate of 400 lb. per acre is recommended for commercial glasshouses. A single

treatment gave economic eelworm control in tomatoes, lettuce and cucumbers for a whole season. No adverse effects on crops were observed as a result of D-D injection in 2 successive years. The maximum increase in tomato yield followed D-D injection at 200 lb. per acre and larger amounts did not result in further yield increase. This treatment, however, gave only partial eelworm control and left the soil still infected. The best results were obtained when the soil temperature at the time of injection was between 40° and 50° F. and the treatment was applied one month before planting.

1513. MCBETH, C. W.
 Observations on repeated applications of D-D (dichloropropene-dichloropropane).
Plant Dis. Rept., 1951, 35: 243-5, illus.

D-D applied annually at up to 400 lb. per acre leaves no residue accumulating in the soil which is toxic to plants. Larger and healthier tomato, tobacco, melon and cowpea plants have been grown on an area treated with 400 lb. of D-D each year for 5 consecutive years than on an adjacent, untreated area.

1514. LEAR, B.
 Use of methyl bromide and other volatile chemicals for soil fumigation.
Mem. Cornell agric. Exp. Stat. 303, 1951, pp. 48, bibl. 33, illus.

Investigation of methods of fumigant application against nematodes led to the following among other results: The application of ethylene dibromide to soil in gelatine capsules proved to be as effective as an equal amount of fumigant injected. In experiments with the root-knot nematode, *Fusarium* spp. and *Pythium* spp. as test organisms, it was found that all fumigants were more effective at soil temperatures over 75° F. A glue-coated paper cover was the most efficient means of retaining methyl bromide in treated soils, though a prompt water seal was nearly as good. Fumigation of potting soils with methyl bromide mixtures in closed containers was successful for the control of *Fusarium* and *Pythium* spp. causing damping-off of peas, and against emergence of weed seedlings. Club root of cabbage caused by *Plasmodiophora brassicae* was controlled with D-D mixture, chloropicrin and methyl bromide solutions.

1515. CHITWOOD, B. G.
 Root-knot nematodes. II. Quantitative relations of the root-knot nematode, *Meloidogyne hapla* Chitwood, 1949, with tomatoes, onions and lima beans.
Plant and Soil, 1951, 3: 47-50, bibl. 3.

A note on experiments at Beltsville, Md. The quantity of *Meloidogyne hapla* produced on plants is found to depend on amount of inoculum, amount of plant present at the moment of root invasion, plant family, genus, species and variety. [From author's conclusions.] The author notes that temperature is also a governing factor and that the effect on the host is a complicated interaction.

1516. OTEIFA, B. A.
 Effects of potassium nutrition and amount of inoculum on rate of reproduction of *Meloidogyne incognita*.
J. Wash. Acad. Sci., 1951, 41: 393-5, bibl. 5.

Lima bean plants in sand culture were inoculated with inoculum of the root-knot nematode, *Meloidogyne incognita*, obtained from tomato, and were submitted to three nutrient treatments, namely low, intermediate and high potassium concentrations. Two levels of inoculum, viz. 50 and 200 egg masses, were used. Among plants receiving the smaller amount of inoculum the rate of nematode reproduction was apparently limited by the amount of potassium available. Where, however, more inoculum and higher K concentrations were used, rates of reproduction were correlated with amount of root available and with number of nematodes rather than with K available. [From author's summary.]

1517. LOWER, H. F.

The vegetable jassid (*Austroasca viridigrisea*) in South Australia.
J. Dep. Agric. S. Aust., 1951, 55: 64-8, bibl. 1, illus.

The vegetable jassid is described and its life cycle shown in a diagram. It is particularly destructive to potatoes and tomatoes, also attacking cucumbers, melons, French beans, celery, lucerne and many weeds. When the feeding marks on leaves become clearly evident DDT as a 2% dust or a 0.1% spray should be applied.

1518. ZIA-UD-DIN.

Tests of lindane and other insecticides for control of *Lygus oblineatus*.
J. econ. Ent., 1951, 44: 773-9, bibl. 11.

Fourteen insecticides at three concentrations, low, medium and high, were tested against the tarnished plant bug, *Lygus oblineatus*, on Chinese cabbage, grown in a greenhouse of Michigan State College. Lindane, chlordane and parathion gave 100% control at high concentration. In field experiments lindane proved significantly better than parathion, TEPP, and nicotine+pyrethrum+sulphur for the control of the bug on Chinese cabbage. On celery lindane again was the most effective, the number of applications being a very important factor, affecting both yield and quality of crop.

1519. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The rutherghlen bug (*Nysius vinitor*).
Agric. Gaz. N.S.W., 1951, 62: 535-6, illus.

The morphology, life history and habits of the rutherghlen bug, which damages a number of vegetables and fruits, are outlined. When peaches, apricots, cherries, etc., are infested they may become so pitted and disfigured by exudations of gum that they are spoiled both as fresh or canning fruit. Where fruit trees or such plants as potatoes, cabbages or tomatoes are attacked, control may be obtained by spraying with 0.1% DDT, using a pint of 20% DDT emulsion to 25 gal. water, or by dusting with a 5% DDT powder. Derris, nicotine or pyrethrum dust may also be used. Pumpkins, melon and related vine crops are susceptible to injury from DDT; where these plants are attacked one of the alternative dusts should be used as a deterrent.

1520. STONE, M. W., AND FOLEY, F. B.

Field tests with ethylene chlorobromide on wireworms.

J. econ. Ent., 1951, 44: 711-13.

In a field trial in California ethylene chlorobromide applied at the rate of 22 gal. per acre and ethylene dibromide at 11 gal. per acre gave very good control of sugar beet wireworm, *Limoniulus californicus*, and significantly increased yields in lima beans. Ethylene chlorobromide at a lower rate, 11 gal. per acre, was inadequate for wireworm control, and did not increase yields. The wireworm population in all treated plots was, however, significantly lower than in the untreated.

1521. WENE, G. P.

Parathion and DDT residues on vegetables.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 75-7.

At harvest time the following amounts of parathion residues were found on the vegetables treated: lettuce heads 0.01 to 0.1 p.p.m., flesh of cantaloupes 0.0 to 0.01 p.p.m., and turnip greens 0.34 to 0.51 p.p.m. DDT residues found were: sweet corn 0.0 p.p.m., broccoli 0.0 to 0.15 p.p.m., and cauliflower 0.05 p.p.m. —Texas agric. Exp. Stat., Vescalo.

1522. CEDERMAN, J. A.

The brown snail (*Helix aspersa*).
N.Z. J. Agric., 1951, 83: 207-8, illus.

Measures for the control of the brown snail in garden crops include, among the more general methods, the use of DDT. The plots should be watered with DDT liquid, DDT emulsion or DDT wettable powder using high concentrations of 16% or over for the liquid, 20% or over for the emulsion, and 25% or over for the wettable powder. These should be diluted to 0.2% and applied at the rate of 2 gal. per sq. yard.

1523. FOYTIK, J.

Marketing channels studied.
Calif. Agric., 1951, 5: 10: 2, 10.

Studies on the marketing of several vegetables in California are described. They show, among other things, that of the prices paid by consumers for carrots, celery and asparagus 25%, 34% and 46% respectively represent the return to the grower, the remainder going on marketing.

1524. THOMSON, A. G.

Wastage of vegetables during distribution.
World Crops, 1951, 3: 75-6.

A brief review of investigations being undertaken in Britain by the D.S.I.R. in association with the Ministries of Food and Agriculture.

Asparagus.

1525. SNEEP, J.

De betekenis van de andromonoecische planten voor de veredeling van *Asparagus officinalis* L. (The significance of andromonoecy for the breeding of *Asparagus officinalis* L.) [English summary ½ p.]
Meded. Dir. Tuinb., 1951, 14: 758-66, bibl. 10.

The occurrence of andromonoecious plants (bearing both androgynous and male flowers) makes possible

the production of an entirely male variety. Symbolizing a male plant by Mm and a female one by mm (Rick and Hanna, *Amer. J. Bot.*, 1943, 30: 711-14), the berry originating from an androgynous flower on a male plant is a product of Mm × Mm and the progeny is 1 MM, 2 Mm and 1 mm = 3 male plants to one female. The results obtained were in full agreement with this theory. The MM plants can be identified by test crosses with any female plant. The progeny resulting from such a cross will be entirely male (Mm).

1526. ASTREGO, J. J.
Rassen-, selectie-en hiermede samenhangende problemen bij de aspergeteelt. (Problems connected with research on varieties and strains in asparagus culture.) [English summary ½ p.]
Meded. Dir. Tuinb., 1951, 14: 657-71, bibl. 6.

In trials new strains from the variety Glory of Brunswick gave 25% higher yields than the trade variety, and 35% higher than the American variety Mary Washington. It has been established (1927-1929) that the male plants give higher yields than the female. The first shoots are produced by the males. It is estimated that a bed of male plants only will give a yield 15% above average. When planting, all weak plants should be discarded.

Brassicas.

1527. FARMILO, T.
Raising seedlings of the cabbage family.
J. Dep. Agric. Vict., 1951, 49: 496-7.

These notes include a description of a hot water treatment (122° F.) for the control of some seed-borne diseases, particularly blackleg. Sprouts and cauliflower seed should soak for 20, cabbage for 25 min.

1528. HAINE, K. E.
Vegetative propagation from the broccoli curd after suppression of flowering.
Nature, 1951, 168: 919-20, bibl. 2.

At the Seale-Hayne Agricultural College, Devon, a series of rooted curd cuttings from broccoli plants was transferred in the flower bud opening stage to a glasshouse at about 70° F. where the flower buds aborted and the bracts developed into shoots. It was found that these vegetative shoots could be rooted in sand, and produced plants which did not appear to differ from those raised from seed, and which formed curds at the normal season for the variety. It is suggested that this may be a valuable method of obtaining clones from cross pollinated species.

1529. STOKES, P., AND VERKERK, K.
Flower formation in brussels sprouts.
Meded. LandbHoogesch. Wageningen, 1951, 50: 141-60, bibl. 12, illus.

Brussels sprouts seeds cannot be vernalized; the plants are day-neutral. The seedlings have a juvenile phase during which they cannot be made to flower. A period of subjection to low temperature is necessary for flower initiation in adult vegetative plants. Six to nine weeks cold is necessary to bring about full flowering

in all plants. Flower primordia are initiated and developed in the cold.

1530. WALKER, J. C., AND GALLEGLY, M. E., JR.
Plant nutrition in relation to disease development. VI. Black rot of cabbage and ring rot of tomato.
Amer. J. Bot., 1951, 38: 663-5, bibl. 5, illus.

Cabbage black rot (*Xanthomonas campestris* (Pam.) Dows.) and tomato ring rot (*Corynebacterium sepedonicum* (Spiek. & Koth.) Skapt. & Burk.) were studied at a range of nutrient concentration levels and at high and low levels of nitrogen, phosphorus and potassium. Black rot decreased while ring rot increased in severity with increase in concentration level. The unbalanced nutrients had no significant effect on either disease. It is pointed out that in the vascular diseases studied so far, those with pathogens that can use non-organic nitrogen in the culture medium decrease with increase in nutrient concentration level supplied the host, while those with pathogens which require organic nitrogen in the medium increase with increase in nutrient concentration. [Authors' summary.]—Univ. Wisconsin.

1531. POUND, G. S., AND WALKER, J. C.
Mosaic resistance in cabbage.
Phytopathology, 1951, 41: 1083-90.

A relatively high degree of resistance to mosaic can be developed within most if not all cabbage varietal types. Resistant lines can be readily obtained by hybridization of resistant and susceptible varieties followed by selection.—Univ. of Wisconsin.

1532. BIEDERMANN, W., AND MÜLLER, E.
Die Inaktivierung des gelösten Kupfers (II) in Fungiziden. (Inactivation of dissolved copper (II) in fungicides.)
Phytopath. Z., 1951, 18: 307-38, bibl. 37.

The effect of copper compounds on the germination of conidia of *Alternaria tenuis*, one of the fungi associated with a seed pod necrosis of cauliflowers [*H.A.*, 20: 1644], was investigated. It was found that only the free Cu²⁺-ion is able to kill the conidia, whilst complex bound copper is not. Some of these complex substances can inactivate copper.

1533. GREAVES, T., AND VENABLES, D. G.
Insecticidal control of cabbage pests: Canberra 1944-48.
Bull. C.S.I.R.O. Aust. 258, 1950, pp. 51, bibl. 10.

The most important pests in the Canberra district are diamond back moth (*Plutella maculipennis*) and cabbage aphid (*Brevicoryne brassicae*). DDT was outstanding in its control of the moth and of the butterfly (*Pieris rapae*). The most effective control of the aphid was achieved by the use of dusts containing 2-4% w/w nicotine or 0-125% gamma isomer BHC, sprays containing 0-125% HETP applied freshly mixed and sprays containing 1% soft soap. No single insecticide completely controlled both moth and aphid. DDT-nicotine dusts in which hydrated lime or other alkaline materials were used as diluents failed to control the moth.

1534. PASFIELD, G.

Control of cabbage pests. Are cabbage white butterfly larvae resistant to DDT?

Agric. Gaz. N.S.W., 1951, 62: 477-80, bibl. 1.

There is no evidence that the larvae are developing resistance; 1% or 2% DDT dust or 0.1% DDT spray need be applied only once every three weeks during the late autumn, winter and spring for satisfactory protection of cabbage, cauliflowers, etc., from cabbage moth (*Plutella maculipennis*) and cabbage white butterfly (*Pieris rapae*) infestations. In the summer and early autumn 1% or 2% DDT dusts or 0.1% DDT spray should be applied at intervals of not longer than a fortnight. Infestations of slatey-grey aphids (*Brevicoryne brassicae*) were prevented from building up by 1% DDT-2½% nicotine dust; 5% nicotine dust very quickly controlled the heavier infestations.

Celery.

1535. TAYLOR, C. A.

Treating celery seed as an aid to direct field sowing.

Seed World, 1951, 69: 11: 10, 12.

In a trial in California celery seed, after pre-soaking, was treated for 2 hours in a 1% solution of sodium hypochlorite. At the end of the 2-hour period the solution was drained off, the seed was rinsed in plain water and dried and stored until needed for pre-sprouting. Eight days before sowing it was soaked again, spread on moist seed trays and placed in a dark room or cabinet of nearly 100% humidity and equipped with a thermostatic heat control. The temperature was maintained at 70° F. for 8 hours and at 50° F. for 16 hours daily. The seedlings started to emerge soon after sowing (3½ days), a very good stand was obtained, and at the time of the first weeding they were not obscured by the weeds.

1536. HERING, E. M.

Ein neuer Sellerie-Feind, *Melanagromyza apii*, sp.n. (Dipt. Agromyz.). (A new pest of celery, *Melanagromyza apii*, sp.n. (Dipt. Agromyz.).)

Ann. Mag. nat. Hist., 1951, 4: 736-45, illus.

An entomological description of a dipterous insect which has been found causing damage to celery in New South Wales. The larvae mine in the petioles of the leaves.

Cucurbits.

(See also 1619h.)

1537. FAAN, H. C., AND JOHNSON, J.

The overwintering of the cucumber mosaic virus.

Phytopathology, 1951, 41: 1001-10, bibl. 16 [previously noted from abstract *Ibidem*; *H.A.*, 21: 27081].

In a survey of the cucumber mosaic virus during the growing seasons of 1948 and 1949 in Wisconsin, 2,153 specimens from 160 plant species were collected and tested. Among the perennial and biennial hosts previously reported in the literature, seven were confirmed in the present investigation. Eight new perennial hosts were found in nature. Of all the

perennial hosts only five were wild species. Several ornamental plants were found to be overwintering hosts, and of these perennial phlox appears to be more commonly infected though less widely distributed than wild species such as milkweed.—Univ. of Wisconsin.

1538. WILES, A. B., AND WALKER, J. C.

The relation of *Pseudomonas lachrymans* to cucumber fruits and seeds.

Phytopathology, 1951, 41: 1059-64, bibl. 5, illus.

Progressive invasion of the mature fruits following earlier penetration of stomata is common. The bacteria advance intercellularly and eventually reach the seed.—Univ. Wisconsin.

1539. HUFFMAN, W. A. H., SCOTT, W. C., AND LIME, B. J.

Identification of sugars in "Rio Sweet" cantaloupes.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 83-6, bibl. 6.

D-sucrose, D-glucose, and D-fructose were detected as constituent sugars of Rio Sweet cantaloupes by paper chromatography. Acid hydrolysis revealed no additional sugars. Aqueous extracts gave the same qualitative results as 80% alcoholic extracts. [Authors' summary.]

1540. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The pumpkin beetle (*Ceratia hilaris*).

Agric. Gaz. N.S.W., 1951, 62: 537-8, illus.

The pumpkin beetle is one of the most serious pests of cucurbitaceous plants such as pumpkins, melons, squashes and cucumbers. The beetles may attack the plants in all stages of growth, but the chief damage is caused to the young plants; especially to those just emerged. The characters and habits of the beetle are outlined. Control measures include (1) the protection of the young plants by daily dustings with hydrated lime, flour, or a mixture of equal quantities of hydrated lime and tobacco dust, (2) protection of well-established plants by applying derris dust, or a mixture of pyrethrum powder (1 lb.) and kaolin or flour (4 lb.). Pumpkins, melons and related vine crops are susceptible to DDT injury but light applications of an 0.01% DDT spray may be used without serious injury to the plants. Heavy seeding is advisable to provide for loss by beetle attack.

1541. REID, W. J., Jr.

Zinc ethylene bisdithiocarbamate toxic to pickleworm and melonworm.

J. econ. Ent., 1951, 44: 817-18, bibl. 1.

In trials in South Carolina the fungicide applied at the rate of 2 lb. per 100 gal., while not so effective as lindane, did reduce pickleworm, *Diaphania nitidalis*, and melonworm, *D. hyalinata*, populations.

Legumes.

(See also 1149, 1165, 1619e, f, i, m, o, p.)

1542. CLORE, W. J., AND STANBERRY, C. O.

Growing lima beans in irrigated central Washington.

Bull. Wash. St. agric. Exp. Stats. 530, 1951, pp. 19, bibl. 6.

California, Delaware and New Jersey lead in the production of green lima beans, which are a warm season vegetable unable to stand cold. Under Washington conditions the small lima needs 85-110 days, the large one 10 to 20 days longer, to obtain green bean maturity. Notes are given here on cultivation under irrigation, harvesting and pest and disease control.

1543. SMITH, W. P. C., HARVEY, H. L., AND GOSS, O. M.
 "Westralia"—a new rust resistant pole bean.
J. Agric. W. Aust., 1951, 28: 317-24, bibl. 3, illus.

Westralia, a pole bean resistant to rust, *Uromyces appendiculatus*, was raised from a natural cross between the susceptible Golden Harvest and rust resistant strain of brown seeded Kentucky Wonder. It is white seeded, high yielding, and suitable both as a fresh bean and for canning.

1544. CAVANILLAS R., L., AND ANGULO CARPIO, M. D.
 Estudios sobre transpiración vegetal. Judías cultivadas en lisímetros. (Transpiration studies on beans grown in lysimeters.) [English summary $\frac{1}{2}$ p.]
An. Edaf. Fis. veg. Madrid, 1951, 10: 603-24, bibl. 9.

In these lysimeter studies with French beans, 2 types of soil and 2 varieties of bean were used. Data are tabulated showing the effect of water supply on transpiration and yield. The quantity of water consumed by the plant increased with the quantity of water supplied. Yield also increased up to a certain limit with increase in water supply, the limit varying with the soil conditions and the variety. Evapo-transpiration followed a similar curve in all the experiments, being lowest during the first and last 20-30 days of the life of the plants. It is considered possible from these data to calculate the amount of irrigation required. The effect of water supply on the number and characteristics of stomata is also reported.

1545. BAWDEN, F. C., CHAUDHURI, R. P., AND KASSANIS, B.
 Some properties of broad-bean mottle virus.
Ann. appl. Biol., 1951, 38: 774-84, bibl. 11, illus.

A severe disease in a field crop of broad beans (*Vicia faba*) in Nottinghamshire in 1947 was found to be caused by a previously undescribed virus, provisionally named broad-bean mottle virus. Its distribution in the field suggested spread by a vector, but none of the six insects tested transmitted it. Its host range, and its serological and physico-chemical properties are described.—Rothamsted Experimental Station.

1546. THOMAS, H. R.
 Yellow dot, a virus disease of bean.
Phytopathology, 1951, 41: 967-74, bibl. 14, illus.

It is concluded from trials in Oregon and Washington that yellow dot virus is a strain of alfalfa mosaic virus. It causes primary veinal necrosis followed by petiole and stem discoloration on most dry bean varieties, accompanied by an extremely mild mottle in some

varieties with development of thinly scattered small bright-yellow dots on all bean varieties.

1547. CRUICKSHANK, I. A. M.
 Fusarium-foot-rot of peas in New Zealand.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 3: 62-5, bibl. 3, illus.

Fusarium-foot-rot (*Fusarium solani* var. *martii*), occurring in pea-growing districts in New Zealand, is characterized by seed decay, pre-emergence rot, seedling rot, and foot rot. In soil heavily inoculated with the fungus no variety tested showed resistance to the disease and none of the seed-dressings tried controlled it.—D.S.I.R., Christchurch, N.Z.

1548. CRUICKSHANK, I. A. M.
 Pea-wilt in New Zealand.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 4: 75-80, bibl. 1, illus.

In continuation of his work on pea-wilt [see above, no. 1547] the author finds that of 24 varieties tested, 9 garden varieties and 4 field varieties are resistant to this disease. The varietal resistance of the 24 varieties is shown in a table.

1549. SCHREUDER, J. C.
 Een onderzoek over de Amerikaanse vaat-ziekte van de erwten in Nederland. (The fusarium wilt of peas in the Netherlands.) [English summary 1 p.]
Tijdschr. PlZiekt., 1951, 57: 176-206, bibl. 42, illus.

"Pea-sickness" in the Netherlands is due to pathogenic soil fungi which cause foot rot and wilt diseases of peas. The most serious of these is fusarium wilt caused by *Fusarium oxysporum* f. *pisi* (Linf.) race 1 Sn. & H. This disease is described and reference is made to others with somewhat similar symptoms. The disease develops rapidly and often causes a total failure of crop. In disinfection experiments it was found that formalin had some effect but was not wholly efficient because it did not penetrate easily into clay soil. Carbon disulphide had no effect.

1550. STARR, G. H., AND OTHERS.
 Antibiotics for bean blight control.
Agron. J., 1951, 43: 617.

When bean seed, naturally infected with bacterial blight, was treated with a 1:100 streptomycin solution for 15 minutes and the plants grown on in the greenhouse, no symptoms of infection developed. When treated seed was grown in the open, however, blight eventually appeared. Increasing the period of treatment to 1 hour caused the seed coats to slip and reduced germination. Soaking the seed in a 1:7 solution of liquid latex for 30 minutes previous to the streptomycin treatment prevented the seed coats from slipping. Field tests are now being conducted to determine the length of treatment required for outdoor sowings.—Wyoming agric. Exp. Stat.

1551. DAVICH, T. B., AND APPLE, J. W.
 Pea aphid control with contact and systemic insecticidal sprays.
J. econ. Ent., 1951, 44: 528-33, bibl. 4.

Parathion at 0.2 lb. per acre was highly effective against the pea aphid, *Macrosiphum pisi*, and the new phosphate insecticide, 0-(2-chloro-4-nitrophenyl) 0,0-dimethyl thio-phosphate, was equally good. In preliminary trial

octamethyl pyrophosphoramidate applied at the rate of 1 lb. per acre to foliage and 4 lb. per acre to the soil prior to seeding was found satisfactory. In another experiment foliage sprays of 0.25 lb. of trialkyl seleno phosphate or trialkyl thiophosphate per acre gave significantly better aphid control 16 days after application than a like amount of octamethyl pyrophosphoramidate, but 29 days following treatment all three materials appeared to be about equal. On analysis canned peas from the plots treated with the three systemic insecticides showed 0.25 and 0.15 p.p.m. of trialkyl seleno phosphate and trialkyl thiophosphate, respectively, while no toxicant was found in the peas treated with octamethyl pyrophosphoramidate. Dried pea vines, taken at harvest time, contained 1 p.p.m. of trialkyl thiophosphate.

1552. BRONSON, T. E., AND DUDLEY, J. E., Jr.
Two systemic insecticides for control of the pea aphid.

J. econ. Ent., 1951, 44: 747-50, bibl. 7.

"Greenhouse tests showed that octamethyl pyrophosphoramidate was toxic to the pea aphid when solutions were sprayed on pea plants, poured on the soil in which the plants grew, and when pea seed was treated before being planted. In field tests pea plants sprayed with solutions of this material were highly toxic to the aphid. When pea seed was treated before being planted, octamethyl pyrophosphoramidate provided significant control of the pea aphid for approximately 6 weeks after treatment in a season when the infestation was very slow in developing." The other insecticide used, a trialkyl thiophosphate, was found less effective.

1553. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

Report on a study of pea harvesting [in Lincolnshire, England], summer 1947.

[Mimeo. Publ.] *Farm Mechanization Enquiry N.I.A.E.*, ? 1948, pp. 6 [received 1951].

A study of 5 methods of harvesting peas for drying and one method of harvesting them for canning.

1554. TOOLE, E. H., AND OTHERS.

Injury to seed beans during threshing and processing.

Circ. U.S. Dep. Agric. 874, 1951, pp. 10, bibl. 5, 5 cents.

Mechanical injury to bean seed resulting from threshing and processing observed on commercial samples over a 2-year period was found to be serious and is here detailed. The conclusion is reached, however, that it is impossible in commercial seed to evaluate separately the influences of such factors as time of harvest, weathering, resistance to impact and moisture relations; hence further progress in the investigations demands controlled studies of specially selected samples threshed with a minimum of mechanical injury.

1555. HIVON, K. J., DOTY, D. M., AND QUACKENBUSH, F. W.

Ascorbic acid and ascorbic acid oxidizing enzymes of green bean plants deficient in manganese.

Plant Physiol., 1951, 26: 832-5, bibl. 5, being *J. Pap. Purdue Univ. agric. Exp. Stat.* 489.

The manganese level did not consistently affect the amount of ascorbic acid or the ascorbic acid-oxidizing activity of the plant tissue studied.

Mushrooms.

(See also 1619b, c.)

1556. LOIREAU, L.

Le champignon de couche: culture, obtention du blanc, parasites. (The cultivated mushroom: culture, raising the spawn, pests.)

Rev. Mycol., 1950, Vol. 15, *Mém. hors-série* 5, pp. 96, bibl. 15, illus., 600 fr. in France, 800 fr. abroad, 12, rue de Buffon, Paris (V^e).

This is more than a manual on mushroom growing—it is a book with a purpose. The author sets out to strip mushroom growing of the mystery in which it is jealously shrouded by the specialists and to disclose its secret "that there is no secret". For satisfactory progress to be made, growers must be well informed of the scientific bases of production.

After describing simply the growth habit of the mushroom, he discusses the advantages of various types of manure that can be used and of the different sorts of quarry which are commonly used for mushroom growing in France. Practical directions are given for the treatment of the manure, the preparation of the beds, spawning, casing, harvesting and disinfecting the caves, many of the operations being illustrated. The section devoted to pests and diseases lays particular stress on the importance of hygiene and of determining the most effective moment at which to apply control measures. A special feature of the book is the section dealing with the importance of pure spawn and the methods of producing it, a subject on which the author has done much work. Following this, recent investigations on the use of artificial compost and electricity in mushroom culture are evaluated, methods of production in Belgium and the United States are briefly reviewed, and suggestions are made for improving the industry in France. Two steps are considered highly desirable: a spawn-raising laboratory should be established in each important mushroom-growing district, and specialized courses of instruction should be available to growers. Finally, advice is given to amateurs wishing to grow mushrooms in the open, in cellars or other available corners. Care and observation, claims M. Loireau, are the two qualities needed by the successful grower.

P.R.-D.

Onions, leeks and shallots.

(See also 1619g.)

1557. THOMAS, P. H.

Onion culture.

Tasm. J. Agric., 1951, 22: 320-31, illus.

An account is given of onion cultivation in Tasmania with reference to climate, soil, fertilizer requirements, and chemical weed control. The chief varieties of the commercial onion (*Allium cepa*) are briefly described; reference is made to the Egyptian or tree onion [a form of *A. cepa*] and notes are given on the cultivation of leek (*A. porrum*), garlic (*A. sativum*), shallot (*A. ascalonicum*), chives (*A. schoenoprasum*), and the white Welsh onion or ciboule (*A. fistulosum*). Advice is given

on the control of insect pests and fungal diseases of onion.

1558. NOLTE, H.-W.

Die Bekämpfung der Larve der Zwiebel-fliege (*Hylemyia antiqua*) mit Kontakt-insektiziden. (The control of the onion fly larva by means of contact insecticides.) *NachrBl. dtisch. PflSchDienst, Berlin*, 1951, 5: 46-8, bibl. 4.

Of 19 compounds tested in field trials against onion fly larvae phosphoric acid esters and Gesapon proved effective, but only if two applications were made at the rate of 3 litres/m² per treatment. Owing to the large amount of water needed for spraying, control of the pest by these compounds would be uneconomical on a field scale.—Aschersleben Branch of the Biol. Zentralan-stalt.

1559. WENE, G. P., AND WHITE, A. N.

Control of onion thrips during the 1951 season.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 80-2, bibl. 2.

The systemic Systox was found ineffective in controlling *Thrips tabaci* on onions in Texas.

1560. CARLSSON, G.

Hammenhög's gräslök Special OJO för drivning. (The forcing leek variety Special OJO.) [English summary 3 lines.] *Medd. Gulläkers VäxtförädlAnst., Hammenhög*, 1951, No. 7-8, pp. 187-90, bibl. 1, ill.

Selection work carried out at Gulläkers Plant Breeding Station led to the development of the leek variety Special OJO, which is suitable for forcing.

1561. MURIAUX, L.

Deux nouveaux parasites du poireau. (Two new pests of leek.) *Rev. hort. Paris*, 1951, 123: 595.

During 1951 considerable damage was done to leeks grown in enclosed gardens in the Neuilly-sur-Marne district by the dipterous insects *Drosophila phalerata* and *Scaptomyza gramineum*. Plants in the open field were rarely attacked, which suggests that the insects prefer sheltered situations. Until the biology of the flies has been studied, recommendations for control cannot be made.

1562. NEEDHAM, M. M., AND WARNE, L. G. G.

Spacing experiments on vegetables. V. The effect of spacing and manuring on the composition of the foliage of shallots and globe beet, considered in relation to the growth of the plants. *J. hort. Sci.*, 1952, 27: 101-9, bibl. 5.

Manuring and size of planting material affect the composition of shallot foliage. Spacing affects the composition of the foliage, but the only consistent effect is on the unmanured plots, where close spacing reduces the nitrogen content of the leaves. On unmanured plots (and with shallots on the manured plots of large planting material) the nitrogen content of the leaves is positively correlated with root (beet) or bulb (shallot) weight. On the other manured plots there is no such correlation, although the dependence

of size on available space remains.—Manchester University.

1563. STATENS FORSØGSVIRKSOMHED I PLANTE-KULTUR.

Forsøg med varmebehandling af skalotteløg til saettebrug. (Trials on the storage temperature of shallots prior to planting.) *Tidsskr. Planteavl*, 1951, 55: 173-4, being *Medd. Stat. Forsøgsvirks. Plankult.*, 459.

At Aarslev Research Station shallots of about 15 g. were stored in January and February at different temperatures and for different periods and then kept at 10-15° C. until they were planted out at Hornum and Virum Research Stations. Highest yields were obtained from the lots stored for two months at 30° C. Heat treatment at 40° C. for the last 24-36 hours prevented fungus rots.

Root crops.

(See also 1562, 1619k.)

1564. WARNE, L. G. G.

Spacing experiments on vegetables. VI. A comparison of the results obtained in 1948 and 1949 in experiments on thinning with root crops in Cheshire, with suggestions as to desirable plant populations for these crops. *J. hort. Sci.*, 1952, 27: 110-16, bibl. 7.

On the basis of results of thinning experiments on beet, parsnips and carrots, certain ranges of plant populations are suggested which appear desirable for these crops if maximum yields are to be assured on fertile soils in the north-west of England.—Manchester University.

1565. HAWTHORN, L. R.

Cultural studies on carrot stecklings in relation to seed production.

Circ. U.S. Dep. Agric. 877, 1951, pp. 21.

The more general conclusions drawn from experiments with Red Core Chantenay carrots at Logan, Utah, were: Within practical limits, it is almost impossible to produce in an unthinned seedbed a crop of carrot stecklings of uniform size. Late planting prevented the development of many large stecklings, but early planting did not prevent the appearance of small ones at harvest-time. The rate of seeding had a great over-all effect on the total number of stecklings harvested, although it did not noticeably influence their size. Under favourable storage conditions stecklings of all sizes kept equally well. The use of medium-size and large stecklings resulted in better stands of seed plants than did that of small ones. The larger the steckling from which the carrot seed plant was grown the earlier the flower buds appeared, flowers opened and seed matured. Harvesting when the second order heads turned brown seemed safest. Steckling size had little effect on the viability of the harvested seed.

1566. KEDROV-ZUKMAN, O. O.

The effect of boron fertilizer applied as a spray on seed production of carrot (*Daucus carota*). [Russian.] *Selek. Semenovod.*, 1951, 18: 10: 75-6.

The spray, consisting of 100 g. of boron magnesium sulphate in an amount of water sufficient for treatment

of an area of 100 sq. m., was applied on 21 June, during the period when the carrot seed plants were in the budding-early flowering stage. Spraying increased the total seed yield by 59% compared with untreated control, the yield of large seeds being increased by 39% and that of small seeds by 75%. Seeds of the sprayed plants ripened considerably earlier than those of the untreated control plants. The method is particularly suitable for seed production of carrot and beet in Moscow Province and more northerly regions. R.P.J.

1567. REYNOLDS, H. T., AND SWIFT, J. E.
Control of *Petrobia latens* in the Imperial Valley of California.
J. econ. Ent., 1951, 44: 642-5, bibl. 2, being
Pap. Calif. Citrus Exp. Stat. 684.

Acaricidal dusts were applied at rates varying from 33 to 45 lb. per acre against a species of mite, *Petrobia latens*, which attacks carrots. 1% parathion plus 85% sulphur, 1% 0,0-dimethyl-S-(2-oxo-ureidoethyl)-dithiophosphate, sulphur, and 1% parathion gave 94% to 98% control within 7 days of treatment. Some of the other materials tested were remarkable for their speed of action at temperatures ranging from 95° to more than 100° F.

1568. KEITH, T. B., AND WATSON, R. D.
Comparison of carrots' nutritive value with similar feeds.
Seed World, 1951, 69: 7: 12, 14.

Surplus carrot stockings can be utilized as fodder, thus reducing the cost of seed production. With the improvements in production methods, involving chemical weeding and mechanical harvesting, it appears that carrots could be grown as an intensive crop for livestock feed. Their nutritive value compares favourably with that of the conventional fodder crops and fresh carrots yield a greater quantity of total feed per acre than corn, beet pulp, potatoes or alfalfa hay.

Salad crops.

(See also 1619h.)

1569. JACKSON, A. A.
Witloof chicory.
J. roy. hort. Soc., 1952, 77: 47-54, bibl. 13, illus.

Cichorium intybus is grown mainly for its roots, which, when dried, roasted and ground, provide a substitute and diluent for coffee. The two varieties grown for this purpose are the Brunswick and Magdebourg, and it is from the latter that witloof chicory, used as a fresh vegetable during the winter, has arisen. Notes are given on the general principles of production, the technique of forcing described being based on the best Belgian practice, supplemented by 3 years' experience in growing the crop in the Horticultural Department at Wye College.

1570. KERS, D.
De witlofteelt. (The culture of witloof chicory.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 647-56.

Important centres for cultivation of witloof chicory are the provinces of North and South Holland. A loam soil is suitable. If the soil is fertile nitrogenous fertilizers can be omitted, a moderate dressing of

phosphates is sufficient, and potassic fertilizers are not essential. Onions do well after witloof, but witloof should not follow chicory (coffee substitute). In general Belgian strains are best for early forcing, while the Dutch ones give the best results later in the season. The highest yields are obtained with plants set 200,000 per ha. Soil temperature affects production. Certain strains give better results at 22° than at 17° C., but the latter is generally aimed at in the Netherlands.

1571. PARMENTIER, G.
Essai de forçage de la chicorée witloof sur milieu liquide. (An experiment on the forcing of witloof chicory in water culture.)
Bull. Inst. agron. Gembloux, 1951, 19: 148-54.

Extensive water culture experiments with chicory roots led to the following conclusions. (1) The tightness of the head depends partly on the forcing conditions but is also a genetic factor. (2) The mineral composition of the forcing medium is important, and the larger the roots the more important it is to have a medium rich in nutrients. (3) The weight of the head produced increases progressively with the weight of the root forced. (4) Boron in the forcing medium tends to increase the number of lateral roots formed. In a liquid-medium this does not affect yield, but it would probably do so in soil.

1572. PERNIOLA, M.
Influenza della concimazione azotata sulla composizione della cicoria "catalogna" (*Cichorium intybus*). (The effect of nitrogenous manuring on the composition of Catalogna chicory.)
Ann. Sper. agrar., 1951, 5: 667-77, bibl. 23.

Statistical analysis of results of trials shows that the application of nitrogenous fertilizers appreciably increased protein content in chicory. It had, however, no effect on the dry matter content.

1573. FRIEDMAN, B. A.
Pseudomonas marginalis as the cause of soft rot of imported witloof chicory.
Phytopathology, 1951, 41: 880-8, bibl. 25, illus.

A bacterial soft rot found on witloof chicory (*Cichorium intybus*) imported from Belgium was caused by *Pseudomonas marginalis*. Decay lesions enlarge most rapidly at about 75° to 80° F., but appreciable rot occurs at 36° to 48° F. Careful handling to avoid bruising and a lower transit temperature (32°-33° F.) than now employed are suggested to reduce decay during transport and marketing. Bacteria from witloof caused soft rot when inoculated into a number of other vegetables. —U.S. Department of Agriculture, New York.

1574. VERKERK, K.
Extra belichting bij vroege andijvie. (I).
(Extra illumination of early endive. (I).)
[English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 925-40.

Early in January, 1951, endive was sown in a hothouse, one portion under 12 hours strong light per day of an intensity of 6,000 Lux by TL tubes, another under normal winter daylight. After about 7 weeks the plants were set out in frames, some warm, some cold.

After mid-March, as the days became longer than 12 hours, a part of each group received short-day treatment of 8 hours per day. The effect of light before planting into the frames was the production of 50% heavier heads. Application of warmth gives a harvest a fortnight earlier and 10% higher yield. Short-day treatment gives a later harvest and a smaller yield. The combination of light and warmth offers the best treatment, both for green harvest and for seed crop, while short-day treatment is of no practical value.

1575. MADARIAGA, F. J., AND KNOTT, J. E.

Lettuce growth rates.

Calif. Agric., 1951, 5: 10: 4.

The system of using temperature sums to predict maturity dates did not prove reliable in studies made on lettuces in California. The growth rate of lettuce was most affected by the month of planting.

1576. DEMPSEY, W. H., AND HARRINGTON, J. F.

Red cotyledon of lettuce.

Calif. Agric., 1951, 5: 7: 4, illus.

Studies at Davis, California, have shown that many lettuce seedlings with red cotyledons, now regarded by seed analysts as a symptom of abnormality, do in fact produce normal plants.

1577. GROGAN, R. G., WELCH, J. E., AND BARDIN, R.

The use of mosaic-free seed in controlling lettuce mosaic.

From abstr. in *Phytopathology*, 1951, 41: 939.

Results of tests showed a marked reduction in the percentage of mosaic in the areas planted with disease-free seed, indicating that the use of such seed would be an effective method of controlling the disease.

1578. BROADBENT, L., AND OTHERS.

The spread of lettuce mosaic in the field.

Ann. appl. Biol., 1951, 38: 689-706, bibl. 11.

Two patterns of spread were observed, (1) spread within the crop from seed-borne virus sources, and (2) spread into a crop from nearby infected old plants. More diseased plants often occurred near hedges, woods, trees or buildings than in the open field, presumably because such barriers halted flying aphids. Three species of aphid were common on lettuce: *Nasonovia ribis-nigri*, which infests the heart leaves, and *Macrosiphum euphorbiae* and *Myzus persicae* which infest the outer leaves. *M. euphorbiae* and *M. persicae* are vectors of lettuce mosaic, but the former is less effective than *M. persicae* which, although rarely so numerous as the other two species, is the most important vector. All three species overwinter on lettuce, and migrate from the winter crops during April-May. One obvious way of controlling lettuce mosaic is the production of virus-free seed. Other control measures are: planting or drilling lettuce seed in large blocks, well separated from each other; destruction of diseased crops and crop-remains as soon as possible; treatment of winter crops with an insecticide in November, and the use of insecticides to prevent the production of large aphid populations especially on old crops.—Rothamsted Experimental Station and N.A.A.S., Caversham, Reading.

1579. SLOAN, M. J., RAWLINS, W. A., AND NORTON, L. B.

Residue studies on DDT and parathion applied to lettuce for control of the six-spotted leafhopper.

J. econ. Ent., 1951, 44: 691-701, bibl. 30.

Spray deposits of DDT immediately following the last application were usually larger in plots receiving a greater number of earlier sprays. Parathion was less consistent, probably because of the more complete disappearance of the accumulated deposits from the earlier sprays. Rain caused a reduction of the deposits of both sprays. Most of the residues at harvest were found on the lower leaves which are left in the field when the lettuce heads are cut for market. The highest DDT residue found on market heads when the applications continued up to 11 days before harvest was less than 1 p.p.m.—Cornell Univ. [From authors' summary.]

1580. SLOAN, M. J., RAWLINS, W. A., AND NORTON, L. B.

Factors affecting the loss of DDT and parathion residues on lettuce.

J. econ. Ent., 1951, 44: 701-9, bibl. 28.

The reduction of DDT and parathion residues on lettuce resulting from the combined action of growth and weathering, was shown to be very rapid.—Cornell Univ.

1581. WHITE, J. H.

Observations on the life history and biology of *Tipula lateralis* Meig.

Ann. appl. Biol., 1951, 38: 847-58, bibl. 8, illus.

Observations on commercial watercress beds and in laboratory experiments show that the leatherjacket, *Tipula lateralis*, is primarily a saprophyte feeding on rotting submerged cress leaves, but that it can develop during the final instar on green cress. Populations as high as 250,000 per acre do not affect cress beds adversely. Its life history is described.—N.A.A.S., Shardlow Hall, near Derby.

Spinach.

1582. THOMAS, J. B., BUSTRAAN, M., AND PARIS, C. H.

On the structure of the spinach chloroplast.

[French and German summaries $\frac{1}{2}$ p. each.] *Biochim. biophys. Acta*, 1952, 8: 90-100, bibl. 27, illus.

An electron microscope study of the constitution of spinach chloroplasts is reported.

Sweet corn.

1583. CHAMBERLAIN, W. F.

Pre-silking sprays to control corn earworm and fall armyworm.

J. econ. Ent., 1951, 44: 590-2, bibl. 5, being *Tech. Contr. S.C. Exp. Stat.* 189.

In South Carolina 2 or 3 applications of 3 quarts of 25% emulsifiable DDT or TM-1 diluted to 25 gal. gave good control of corn earworm, *Heliothis armigera*, in

spring-planted sweet corn. When, however, the corn is planted in the summer, 2 extra sprays applied before silking were found necessary to control the corn earworm and fall armyworm, *Laphygma frugiperda*. Some burning and a slight decrease in pollination appeared to have resulted from this spray programme.

1584. HASKELL, G.

Studies with sweet corn. The frit fly problem.

Bull. ent. Res., 1951, 42: 519-26, bibl. 13, illus.

All varieties of sweet corn, in the seedling stage, are susceptible to frit fly, *Oscinella frit*, attacks in England. Different open-pollinated, hybrid and inbred varieties differ in susceptibility to damage by frit, indicating a possible genetical basis for resistance. Dates of sowing influence the severity of attack; peaks vary according to variety and year but generally sowings late in May are preferable. Distribution of attack on a crop is at random, although there is a suggestion that plants in stringers from a central mass are more damaged in the direction of the prevailing wind but there is no regular decrease in incidence with distance from the central mass. [From author's summary.]—John Innes hort. Inst., Bayfordbury.

Sweet potato.

1585. SUMMERS, E. M.

"Ishuku-byo" (dwarf) of sweetpotato in the Ryukyu Islands.

Plant Dis. Repr., 1951, 35: 266-7, illus.

An apparently new, undescribed, virus disease of sweet potatoes [*Ipomoea batatas*] has appeared in the Ryukyu Islands. It is so destructive that sweet potato culture has been discontinued in large areas. Symptoms are excess proliferation of young shoots and dwarfing of subsequent growth; there is little or no latex in diseased plants. Attempts to control the disease by roguing have been only partially successful. The maintenance of a source of certified virus-free vines will probably be very difficult. Some differences in degree of susceptibility of different varieties of sweet potato are evident, but no real resistance to this disease has been found in any variety now growing in the Ryukyus.

1586. SHERMAN, M.

Chemical control of sweetpotato insects in Hawaii.

J. econ. Ent., 1951, 44: 652-6, bibl. 5, being *Tech. Pap. Hawaii agric. Exp. Stat.* 221.

Nine materials were used for soil treatments, preplanting cutting dips, sprays, or combinations of these methods of application for the control of two species of sweet potato weevil, *Euscepes postfasciatus* and *Cylas formicarius elegantulus*, and sweet potato vine borer, *Omphisca anastomosalis*. DDT at 2 lb. of active ingredients per 100 gal., lindane and parathion at 0.25 lb. per 100 gal. and aldrin as an emulsion also at 0.25 lb. gave excellent protection from all three insects when applied as cutting dips in combination with 5 sprays. No off-flavours resulted.

Tomato.

(See also 1147, 1155, 1156, 1158, 1160, 1619d, j, l.)

1587. CARLSSON, G.

Försök med den nya växthustomaten Potentat II. (Trials with the new greenhouse tomato Potentat II.) [English summary 4 lines.]

Försök med den nya växthustomaten Patrik/50. (Trials with the new greenhouse tomato Patrik/50.) [English summary 6 lines.]

Försök med den nya busktomaten Bonita OJO/50. (Trials with the new bush tomato Bonita OJO/50.) [English summary 4½ lines.]

Medd. Gullåkers VäxtförädlAnst., Hammenhög, 1951, No. 7-8, pp. 147-50, bibl. 2; 150-3, illus.; 153-6.

The three varieties were raised at Gullåker's Plant Breeding Station, Hammenhög, Sweden. Their merits are discussed and data are given on yield and parentage.

1588. CASTRONOVO, A.

El Instituto de Fitotecnica presenta tres nuevas variedades de tomate. (The Institute of Phytotechnology, Buenos Aires, releases three new tomato varieties.)

Idia, 1951, 4: 44: 7-11, illus., being *Publ. Inst. Fitotec.* 135.

Selection from the heterogeneous, local population of tomatoes grown round Buenos Aires [see *H.A.*, 22: 595] has resulted in the development of 3 superior and more uniform strains. These are to be released under the names Magnif Justo, Magnif Libre and Magnif Soberano. They are higher yielding, produce a higher proportion of early fruit and are of better quality than the standard Platense type. It is intended to cross these strains with introduced varieties in order to improve quality still further.

1589. KULIK, A. A., AND SOKOVA, O. I.

The alteration in the biochemical composition of the tomato variety Bison as affected by vegetative hybridization.

Biohimija, 1952, 17: 59-60.

In the experiments described, in which the annual variety Bison was grafted on the perennial *Cyphomandra*, the fruit of the resulting vegetative hybrid and of its progeny differed from the normal Bison in being smaller and of different chemical composition, particularly with regard to the vitamin content which was double that of Bison.

1590. RICK, C. M., AND ROBINSON, J.

Inherited defects of floral structure affecting fruitfulness in *Lycopersicon esculentum*.

Amer. J. Bot., 1951, 38: 639-52, bibl. 11, illus.

Six new tomato mutants with gross abnormalities of floral structure are reported. Under field conditions each mutant is highly unfruitful, and attempts were made to discover the reason. The defects in the flowers of these and other mutants subtly demonstrate the importance of the form of parts and their disposition in the tomato flower in guaranteeing self-pollination and consequent fruitfulness. In the majority of

mutants, multiple defects are observed in the flower and, in some, also in other parts of the plant. These apparently pleiotropic effects are discussed briefly. The mutants are evaluated for their possible usefulness in plant-breeding operations. [From authors' summary.]—Univ. Calif.

591. RICADA, D., AND HONNORAT, E.

Note sur la déformation des tomates. (A note on deformed tomato fruits.)

Terre maroc., 1951, 25: 299-301, illus.

During the last tomato crop in Morocco many fields showed up to 20% of deformed fruits. The various types of malformation observed are described and illustrated. Apart from cases attributable to attack by an alternaria, it appeared that most of the deformed fruits developed from flowers that were themselves deformed. The evidence shows that the trouble was not transmitted through the seed even where seed crops had been previously treated with HCH, nor did the malformations bear any resemblance to those caused by hormones. Cucumber mosaic causes malformations in America, but has not yet been identified in Morocco. The main cause of the malformations is thought to be climatic. The season in question was unfavourable; sand storms and sharp variations in temperature resulted in periodic checks to growth. In some cases unbalanced nutrition may have accentuated these effects.

592. STATENS FORSGSVIRKSOMHED I PLANTEKULTUR.

Forsøg med grus- og stenkultur til tomater. (Experimental gravel culture of tomatoes.)

Tidsskr. Planteavl, 1951, 54: 347-50, being *Medd. Stat. Forsøgsvirks. Plante kult.* 453.

The results of a small-scale, preliminary trial showed that soilless culture of tomatoes in gravel and other media gives satisfactory yields under Danish conditions. The study is to be extended, partly in view of its significance for the nutrition of the crop.

593. ANON.

The cost of artificial illumination.

Fruitgrower, 1951, No. 2914, p. 752, illus.

It is claimed that by the use of a suitable illuminating unit now on the market the capital cost of a light installation for illuminating tomato seedlings can be quickly recovered. Figures supporting this statement are given by the General Electric Co. Ltd. Preliminary trials with artificial illumination of cucumbers also showed promising yield increases.

594. REINDERS-GOUWENTAK, C. A., AND

SMEETS, L.

De lichtbehoefte van tomaat in de winter. (Light requirement of tomatoes in winter.)

Meded. Dir. Tuinb., 1951, 14: 407-13, bibl. 9, illus.

Artificial illumination during the day from sunrise until 3 or 3.30 p.m. results in larger early crops than are reported to result from illumination during other periods. Cultivation in exclusively artificial light showed that intensities of at least 800-1,000 foot candles are wanted at the top of the plant. The minimum daily period is about 7½ hours, a period of 6 hours being too short. [English summary.]

1595. REINDERS-GOUWENTAK, C. A., SMEETS, L., AND ANDEWEG, J. M.

Growth and flowering of the tomato in artificial light. I. Vegetative development. [Dutch summary ¾ p.]

Meded. Landb.Hooges ch. Wageningen, 1951, 51: 63-73, bibl. 21, illus.

The tomato may be grown under the high tension mercury lamp HO 2000 as the sole source of irradiation in a darkened glasshouse, and also when natural night and day are reversed. For purposes of photosynthesis light intensity under these circumstances should be about 1,000 foot candles at the top of the plants. The minimum length of the photoperiod of high intensity is about 7½ hours, 6 hours being too short. The 6-hour period may be lengthened with a maximum of 1½ hours of incandescent light of low intensity (4 foot candles) without injury to the plants. If the 7½-hour or 9-hour daily periods are lengthened the plants grow spindly or show reduced leaf areas. Spindly growth is also shown in plants grown with mercury light and 100-watt incandescent lamps (130 foot candles) when the illumination is given simultaneously, but leaf area is rather larger.

1596. SMITH, P. G., AND ZINK, F. W.

Sucrose spray on tomato.

Calif. Agric., 1951, 5: 8: 7, 13, illus.

In preliminary trials foliage sprays of a 10% solution of sucrose plus a small quantity of detergent as spreader applied daily to tomatoes for 3 days before transplanting helped the plants to survive storage, heat and other shocks and encouraged root regeneration.

1597. GILLARD, S. O., AND FULLER, C. E. K.

Irrigation of glasshouse tomatoes.

N.Z. J. Agric., 1951, 83: 287-8, illus.

A "grid soaking" system is described by which plants may be watered both in the field and in glasshouses, though the system is more suitable for glasshouses. Its advantages and disadvantages are set out.

1598. MELTZER, J., AND ELINGS, H.

Opbrengstverhoging en kwaliteitsverbetering van tomaten door groeistofbespuitingen. (Increase in yield and improvement of quality of tomatoes by growth substance sprays.)

[English summary ½ p.]

Meded. Dir. Tuinb., 1951, 14: 297-308, bibl. 3, illus.

The tomato variety Vahle Leader was sprayed with Duphar growth promoting substance for tomato, 6, 5 and 4 times during flowering. The first three pickings showed an increase in yield expressed in weights of 45.5, 38.8 and 18.9%, with increased prices of 52.6, 35.6 and 18.7% respectively over those of control plants. The quality of the tomatoes from sprayed plants was much better than that of the fruit from unsprayed plants. Tomatoes sprayed 5 or 6 times showed a tendency to reduction in yield with the 4th and 5th pickings.

1599. REICHERT, I.

Experiments in hormone control of flower-drop in tomatoes.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 376-81, bibl. 18.

Heat, dry winds and permanently low humidities are

among the factors causing flower drop in tomatoes in some districts of Palestine. Treatment with α -naphthylacetic acid ("Phyomone") reduced drop, significantly increased set but failed to bring the fruit to maturity, while "No seed" (probably based on p-chlorophenoxyacetic acid) was found very effective in inducing early maturity, larger yields and greatly increased fruit size. The possibility of using both these substances simultaneously is discussed.

1600. OSBORNE, D. J., WAIN, R. L., AND WALKER, R. D.

Studies on plant growth-regulating substances. IV. The activity of certain aryloxy acids for inducing rooting and for tomato setting.

J. hort. Sci., 1952, 27: 44-52, bibl. 34.

A wide range of synthetic chemicals has been prepared and examined for activity in promoting the rooting of cuttings and for inducing seedless development of tomato fruits. In rooting experiments, both tomato leaves and privet cuttings were used as test material, using the 24-hour soak method. Several of the compounds were rated as being as effective as 2-naphthoxyacetic acid in inducing the development of good quality seedless fruit and a few showed marked root promoting activity.—Wye College.

1601. HITCHINS, P. E. N.

Some observations on formaldehyde.

Fruitgrower, 1952, No. 2926, p. 138.

Treating the soil with 3% formaldehyde applied at the rate of 7 gal. per sq. yd. resulted in higher yields of tomatoes grown under glass than did steam sterilization, and was considerably cheaper.

1602. RIEUF, P.

Le dessèchement de l'extrémité pistillaire de la tomate. (Blossom end rot of tomatoes [in Morocco].)

Terre maroc., 1951, 25: 302-3, bibl. 1.

The factors responsible for the physiological disorder known as blossom end rot are discussed and it is suggested that growers could reduce the trouble by (i) selecting a deep, fertile soil with a pH approaching neutrality and an adequate reserve of lime; (ii) thorough preparation of the land; (iii) using balanced fertilizers of which P and K form the major part; (iv) sowing seed direct rather than transplanting; (v) carefully controlling irrigation; and (vi) planting early in the year. In Morocco the disorder usually first appears in May, reaches its maximum in July-August and then declines. Certain varieties, notably San Marzano, Ponderosa and Marmande, appear to be more susceptible than others, but it is not certain whether any varieties are really resistant or whether some merely escape the disorder because they are precocious or are grown at times of the year when the trouble is less common. As a general policy, however, growers producing seed are advised to select plants that are free from the disorder.

1603. USCHDRAWITZ, H. A.

Viruskrankheiten der Tomaten. (Tomato viruses.)

Phytopath. Z., 1951, 18: 231-45, bibl. 11, illus.

Tomato virus diseases have been increasingly destructive in recent years in Germany particularly in the neighbourhood of large towns such as Berlin and Hamburg. The chief are tobacco mosaic alone, tobacco mosaic in association with potato X-virus to form the streak disease, and the stunt or dwarf disease.

1604. PRICE, W. C., AND FENNE, S. B.

Tomato rosette, a severe disease caused by a strain of tobacco mosaic virus.

Phytopathology, 1951, 41: 1091-8, bibl. 11, illus.

An infectious yield-reducing virus disease of tomato called tomato rosette, observed in Virginia in 1949 and 1950, causes severe stunting with fern-leaf, rosette, shoestring, or witch's broom symptoms. The virus is immunologically and serologically related to tobacco mosaic virus. It was given the trinomial *Marmor tabaci* H. var. *rosettae* n.var.—University of Pittsburgh.

1605. KENDRICK, J. B., JR., MIDDLETON, J. T., AND CHAPMAN, H. D.

The influence of nutrition upon tobacco mosaic virus-infected tomatoes.

From abstr. in *Phytopathology*, 1951, 41: 940.

Fruit yield was materially reduced by infection. The reduction was minimized with medium-NPK, low-N, and high-K nutrition and accentuated with high-NPK, high-P, and low-K nutrition.

1606. CIFERRI, R.

Gli "scopazzi", una virosi del pomodoro affine alla "aspermia" del pomodoro in Italia. (Witch's broom, an Italian virus disease of the tomato allied to aspermy.)

Not. Mal. Piante, 1951, No. 16, pp. 16-20, bibl. 3.

A disease of tomato plants, allied to, but quite different from the aspermy found in Great Britain (*H.A.*, 20: 1714), is described. The plants are bushy and dwarfed with deformed leaves and interveinal spotting and chlorosis. The fruits are small and bear light spots. The disease has been transmitted to tomato and tobacco plants by sap inoculation.

1607. VAN KOOT, I., AND CAMFFERMAN, J.

Een ziekte bij tomaat, veroorzaakt door een combinatie van tomaten- en komkommermozaiek (*Nicotiana-virus* 1 + *Cucumis-virus* 1). (A complex disease of tomato caused by *Nicotiana virus* 1 + *Cucumis virus* 1.) [English summary ½ p.]

Tijdschr. PlZiekt., 1952, 58: 14-20, bibl. 3, illus.

In the South Holland glasshouse district virus symptoms in tomatoes previously unknown in the Netherlands were observed in the autumn of 1950. (1) Bushy dwarf plants with small curled leaves. Inoculation experiments and serological reaction showed that this is probably caused by combined infection with *Nicotiana virus* 1 and *Cucumis virus* 1. (2) Plants with thread-like leaves ("shoe string") caused by *Cucumis virus* 1.

1608. STAPP, C.
Eine neue Infektionsmethode mit *Bacterium michiganense*, dem Erreger der bakteriellen Welkekrankheit der Tomaten. (A new method of infecting with *Bacterium michiganense*, the cause of bacterial wilting of tomato plants.)
Phytopath. Z., 1951, 18: 111-13, illus.
A new method of infecting plants with the causal organism of tomato bacterial canker is described. Roots of seedlings are washed in water, cut back to about half their length and then immersed for an hour in a water suspension of the bacterium. The degree of susceptibility or resistance of varieties to the disease can be ascertained relatively quickly in this way.
1609. BAKKER, M.
De verandering van de virulentie van *Cladosporium fulvum* Cooke tengevolge van het invoeren van nieuwe tomatenrassen. (Racial trends in *Cladosporium fulvum* Cooke as a result of the introduction of new tomato varieties.) [English summary 4 lines.]
Meded. Dir. Tuinb., 1951, 14: 309-13.
The literature on physiological races of *Cladosporium fulvum*, the leaf mould of tomatoes, is critically reviewed. The subject is to be investigated in Holland.
1610. POUND, G. S., AND STAHMANN, M. A.
The production of a toxic material by *Alternaria solani* and its relation to the early blight disease of tomato.
Phytopathology, 1951, 41: 1104-14, bibl. 12, illus.
Alternaria solani, the cause of tomato early blight, produces a toxic substance which causes chlorosis and necrosis when introduced into tomato plants either from fungus lesions on the plant or as a fungus filtrate.
—University of Wisconsin.
1611. SMITH, C. B.
The nutrient-element balance of the tomato and its susceptibility to *Phytophthora infestans* as affected by two levels of zinc.
Plant Physiol., 1951, 26: 737-49, bibl. 38, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1634.
In this study, Rutgers tomato plants were grown in a greenhouse in rigidly controlled nutrient solutions at two levels of zinc, namely 0.025 and 2.5 p.p.m. These two levels had been selected in a preliminary experiment as being as low and as high as possible without producing deficiency or toxicity symptoms respectively. The variation in the zinc levels resulted in no statistically significant effects on disease susceptibility; but the trend was definitely towards greater resistance to the late blight fungus at the higher zinc concentration. The large increase in the zinc concentration of the leaflets produced at the high zinc level influenced the nutrient-element balance by significantly raising the concentrations of nitrogen, potassium, sulphate, manganese, and molybdenum in the leaflets. [From author's summary.]
1612. JACKS, H.
Soil disinfection. XI. Control of foot-rot *Phytophthora cryptogea* P. & L.) of tomatoes.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 4: 71-5, bibl. 1, illus.
Of 14 materials tested Cuprox 1% and 2%, Phygon 0.063%, Formalin 0.25%, Cheshunt compound 1%, and Puratized 0.063% gave satisfactory control without affecting plant growth, Cuprox being preferred. Other materials, e.g. thiram, firmam, and ziram, gave good control but severely stunted the plants.—D.S.I.R., Auckland, N.Z.
1613. FERGUSON, J., AND STEPHEN, W.
Soil fumigation against *Verticillium albo-atrum*.
From abstr. in *Phytopathology*, 1951, 41: 939.
Soil fumigants were injected into composted soil containing [standardized verticillium inoculum grown on tomato stem pieces placed at measured depths from 1.5 to 24 in. in soil 1 or 2 ft. deep and 2 sq. ft. in surface area in 32-gal. cans. Results were based on recovery in culture of verticillium from the inoculum after treatment. Chloropicrin was effective at 2 c.c./sq. ft., allyl bromide at 2-3 c.c./sq. ft. and Shell CBP-55 (55% chlorobromopropene) at 4-5 c.c./sq. ft.
1614. WENE, G. P., AND WHITE, A. N.
The tomato russet mite.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 78-9, bibl. 3.
In an experiment in Texas 2% EPN 300 and 1.5% Metacide dusts gave the most satisfactory control of tomato russet mite *Phyllocoptes destructor* followed by sulphur and 1% parathion dusts.
1615. WENE, G. P., BURDICK, E. M., AND OTEY, G. W.
Benzene hexachloride contamination in processed tomatoes and turnip greens.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 73-4, bibl. 2.
The data presented indicate that BHC and lindane should not be used on tomatoes or turnip greens destined for canning.
- Sundry other crops.*
1616. LANGE, W. H., JR., SCIARONI, R. H., AND CARLSON, E. C.
Artichoke plume moth.
Calif. Agric., 1951, 5: 9: 4, 15, illus.
Trials have shown that the larvae of the globe artichoke plume moth, *Platyptilia carduidactyla*, can be controlled by correctly timed sprays or dusts of parathion, parathion-DDT or lindane.
1617. VAN DER SLIKKE, C. M.
Mogelijkheden voor de peermeloen (*Solanum muricatum* Ait.) (*S. guatemalense*). (The melon pear.) [English summary 11 lines.]
Meded. Dir. Tuinb., 1951, 14: 157-61, bibl. 3, illus.
Botanical characters, propagation, choice of varieties, method of planting and management of the melon pear

are discussed in relation to experiments carried out in the Netherlands.

1618. BOSWELL, V. R.

Okra: culture and use.

Leaflet. U.S. Dep. Agric. 305, 1951, pp. 8, illus.

This leaflet, which supersedes *Fmrs' Bull.* 232, gives brief descriptions of 6 varieties of okra, soils, manuring, planting, cultivating, harvesting, the control of pests, the food value of the pods and their preservation and uses in cookery.

Noted.

1619.

a BISSINGER, W. E., AND FREDENBURG, R. H.
The determination of micro quantities of isopropyl N-phenylcarbamate (IPC) in head lettuce.
J. Ass. off. agric. Chem. Wash., 1951, 34: 812-21, bibl. 20.

b BURROWS, S.
The chemistry of mushroom composts. I. General introduction and methods of investigation.
J. Sci. Food Agric., 1951, 2: 395-403, bibl. 24.

c BURROWS, S.
The chemistry of mushroom composts. II. Nitrogen changes during the composting and cropping processes.
J. Sci. Food Agric., 1951, 2: 403-10, bibl. 22.

d CANNON, O. S., AND WADDUPS, V.
A greenhouse method for testing tomatoes for resistance to curly top.
Abstr. in *Phytopathology*, 1951, 41: 936.

e CARLSSON, G.
Jämförande försök med mägärtssorten Debut/49. (Comparative trials with the marrow-fat pea variety Debut/49.) [English summary 5½ lines.]
Jämförande försök med sockerärten Sylvester/49. (Comparative trials with the sugar pea variety Sylvester/49.) [English summary 4 lines.]
Medd. Gulläkers VäxtförädlAnst., Hammenhög, 1951, No. 7-8, pp. 174-7, bibl. 1, illus; pp. 177-9, bibl. 1, illus.

f CHIN K. C.
Quelques essais sur la germination de *Phaseolus mungo*. (Germination trials with *Phaseolus mungo*.)
Rev. int. Prod. colon., 1951, 26: 259: 93-4, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 472.

g CHRISTIANSEN, E., AND HENRIKSEN, A.
Forsøg med sorter og stammer af porre 1945-48. (Trials with varieties and strains of leek 1945-48.)
Tidsskr. Planteavl, 1951, 55: 144-62, being *Beretr. Stat. Forsøgsvirks. Plantekult.* 448.

h HILLS, O. A., AND TAYLOR, E. A.
Parasitization of dipterous leaf miners in cantaloups and lettuce in the Salt River Valley, Arizona.
J. econ. Ent., 1951, 44: 759-62, bibl. 1.

i HINTZE, S.
Sortförsök med spritböna vid Alnarp och Nyckelby. (Variety trials with field beans.) [English summary ½ p.]
Medd. Trädgårdsförs., Malmö, 61, 1951, pp. 6, illus.

j KRONE, B. P.
Tomato culture in Southern Victoria.
J. Dep. Agric. Vict., 1951, 49: 493-4, illus.

k MINISTRY OF AGRICULTURE, LONDON.
Beet eelworm. [*Heterodera schachtii*.]
Adv. Leaflet. Minist. Agric. Lond. 233, 1951, pp. 6, illus., 2d.
Damage and prevention.

l MINISTRY OF AGRICULTURE, LONDON.
Mosaic and streak of tomato.
Adv. Leaflet. Minist. Agric. Lond. 38, 1951, pp. 3, illus., 2d.
Symptoms and control.

m MINISTRY OF AGRICULTURE, LONDON.
Pea and bean weevils.
Adv. Leaflet. Minist. Agric. Lond. 61, 1950, pp. 3, 1d.

n MINISTRY OF AGRICULTURE, LONDON.
Onion fly (*Delia (Hylemyia) antiqua* Meig.).
Adv. Leaflet. Minist. Agric. Lond. 163, 1951, pp. 3, 2d.

o VON RÜMKE, R.
Über die Ökologie von *Ascochyta pinodella* und *Fusarium culmorum* in der Rhizosphäre anfälliger und nicht anfälliger Pflanzen. (The ecology of *Ascochyta pinodella* and *Fusarium culmorum* in the rhizospheres of susceptible and non-susceptible plants.)
Phytopath. Z., 1951, 18: 55-100, bibl. 62, illus.
With reference to foot rot and wilting in peas.

p YAMAGUCHI, M., AND JOSLYN, M. A.
Investigations of ascorbic acid dehydrogenase of peas (*Pisum sativum*) and its distribution in the developing plant.
Plant Physiol., 1951, 26: 757-72, bibl. 29, illus.

POTATOES.

General.

(See also 1191, 2006, 2028, 2029.)

1620. STUART, G. M.

The potato in health and disease.*Misc. Publ. Edinb. Coll. Agric.* 75, 1951 (?), pp. 8.

A general discourse on origin is followed by a discussion of present varieties and hints on cultivation and harvesting.

1621. HAWKES, J. G.

Organización y planeamiento para el mejoramiento de la papa. (The programme for potato improvement [in Colombia].)*Agric. trop. Bogotá*, 1951, 7: 5: 7-11, 6: 11-16, 7: 11-18, 8: 13-20, 9: 11-19, 10: 11-14, illus.

An account is given of the establishment of the new potato research station in Usme, Colombia, of its extensive programme for potato improvement and of the work which has so far been done there. A survey of the cultivated and wild potato species in the country, of the prevalent pests and diseases and of the most important problems of production is reported. The programme includes breeding for disease resistance, cold resistance, earliness, quality and adaptation to special areas, comparative trials of hybrids and varieties, cultural trials on time and density of planting and inhibition of sprouting, control of fungus and virus diseases and pests, identification of nutrient deficiencies, and the organization of a seed certification scheme.

1622. SIVORI, E. M.

La degeneración de la papa. (Degeneration of the potato.)*Cien. Invest.*, 1951, 7: 291-302, bibl. 30, illus.

The various theories that have been put forward to explain the degeneration of potatoes are critically discussed. It is concluded that, in a hot climate like that of Argentina, degeneration is the result not only of virus infection but also of the effect of soil temperature on the "ageing" of the tubers. A scheme to overcome this problem in Argentina is outlined as follows: Tubers for seed are sown in early March, harvested April-May, and stored at air temperature until they begin to sprout in June. They are then stored at 4° C. until January, when they are brought into a temperature of 15°-18° C. for an "incubation" period prior to resowing for further seed production. The "incubation" period is intended to bring the seed into a state in which it will produce tubers rapidly in the field. The crop for consumption is produced from a proportion of the seed tubers kept in common store and planted in October or November.

1623. MÜNSTER, J.

Causes probables des accidents constatés dans la levée des plants de pommes de terre en 1950. (The probable causes of abnormalities observed in the 1950 potato crop.)*Rev. romande Agric. Vitic.*, 1951, 7: 25-8, illus.

Seed potatoes imported into Switzerland from Brittany in autumn 1949 and from Holland in spring 1950

produced many abnormalities in the 1950 crop. Some seed did not germinate or produced small tubers but no foliage, in others the shoots recoiled and pierced the parent set, and in many cases sprouting had begun soon after harvest. Fusarium rot was severe in desprouted seed, the point of infection generally being the eye. These phenomena are attributed to the exceptionally hot, dry summer of the preceding season which is thought to have reduced the vitality of the seed crop. Seed that had been treated with Fusarex to prevent sprouting produced a smaller and later crop than untreated seed.

1624. GALLAY, R., AND MÜNSTER, J.

Les efforts entrepris pour améliorer la qualité des plants indigènes de pommes de terre. Les résultats obtenus. (Measures taken to improve the quality of Swiss seed potatoes. The results obtained.)*Rev. romande Agric. Vitic.*, 1951, 7: 91-3, illus.

The obligations of the seed potato grower in Switzerland and the work of the inspection service are outlined. Figures comparing yields obtained from Swiss and imported seed potatoes since 1949 show that Swiss seed is not inferior.

1625. MALLEA, O. S., AND DUPRAT, E.

Posibilidades industriales de la papa. (Industrial possibilities of the potato [in Argentina].)*Bol. Estac. exp. agric. Tucumán* 66, 1951, pp. 19, bibl. 16.

A plan for utilizing the surplus potato crop in Argentina in the manufacture of starch, glucose, alcohol, butanol and acetone is outlined.

Varieties and breeding.

1626. CHRISTIANSEN, E., AND HENRIKSEN, A.

Forsøg med tidlige sorter af spisekartofler 1945-48. (Early potato variety trials.)*Tidsskr. Planteavl*, 1951, 55: 101-20, being *Beretn. Stat. Forsøgsvirks. Planekult.* 445.

From these trials, which were carried out at 4 Government Research Stations, Primula emerged as the most satisfactory variety as regards earliness, quality and yield.

1627. MÜNSTER, J.

Trois nouvelles variétés de pommes de terre pour l'assortiment officiel suisse. (Three new potato varieties for the official Swiss list.)*Rev. romande Agric. Vitic.*, 1951, 7: 65-7, illus.

The variety Bintje constitutes a very large proportion of the potatoes grown in Switzerland, about 63% in French Switzerland. Its susceptibility to blight and its tendency to sprout during the winter make it desirable to reduce its acreage. The 3 varieties Bona, Jakobi and Urgenta, which have now been widely tested, are suggested as possible substitutes. Their qualities are described.

1628. PAGE, O. J.

Potatoes for crisp making.*Agriculture, Lond.*, 1952, 58: 525-7.

Only a few potato varieties will produce potatoes over

a wide range of soils which remain suitable for making good quality crisps for more than a few months. Duke of York, Bintje, Record, Doon Star and Conference are among those which will do so in England.

1629. MONTALDO, A., AND DE ROJAS PEÑA, E. Fitomejoramiento para resistencia al tizón de la papa. (Breeding for resistance to potato late blight.) [English summary $\frac{1}{2}$ p.] *Agric. téc. Chile*, 1950, 10: 66-73, bibl. 2 [received 1952].

Five wild Chilean potato species and a collection of Chilean varieties were tested at the Potato Experiment Station, Bogotá, Colombia, for resistance to *Phytophthora infestans*. All proved very susceptible, the species *Solanum palustre* being especially so. A report is given on new breeding material from Colombia which is being used at the Centinela Potato Experiment Station, Puerto Octay, to combine resistance to late blight with other desirable characters.

Sprouting and planting.

1630. EMILSSON, B., LILLIEROTH, C. G., AND NILSSON, R.

Användning av gröningshämmande medel vid lagring av matpotatis. II. Försök under lagringssäsongerna 1949-50 och 1950-51. (The control of sprouting in stored ware potatoes. II. Trials during the storage seasons 1949-50 and 1950-51.) [English summary 1 p.] *J. roy. Swedish Acad. Agric.*, 1951, 90: 421-49, bibl. 9.

Fusarex applied at 12 g. of active ingredient (2,3,5,6-tetrachloronitrobenzene) per 100 kg. potatoes inhibited sprouting very effectively in all experiments. Under favourable conditions lower dosages were also found satisfactory. IPPC used in one trial only showed considerable promise. Other chemicals tested contained α -naphthaleneacetic acid methyl ester, α -methyl-naphthylmethylether and phenylurethan as active ingredients. Loss of weight and losses through disease were significantly decreased by treatment with Fusarex. No significant effect on the cooking quality of the treated potatoes could be established, except that the tendency to discoloration after boiling was reduced. Storage of potatoes treated with Fusarex and conditions under which the application of sprout inhibitors is economical are discussed.

1631. FRÉZAL, P., AND GERBINOT, B.

Actions de la monochlorhydrine du glycol et du bromure de méthyl utilisés sous pression atmosphérique et sous vide partiel sur la période de vie latente et sur la germination des semences de pommes de terre. (The effect of glycol monochlorhydrin and of methyl bromide, under atmospheric pressure and under partial vacuum, on the latent life period and on the germination of seed potatoes.) *C.R. Acad. Agric. Fr.*, 1951, 37: 556-61, bibl. 7.

Methyl bromide and glycol monochlorhydrin prematurely interrupt the latent life period of seed potatoes and stimulate their sprouting. The limits for the use of these two substances are determined by the technique

employed, the variety, and the condition of the tubers. Sometimes care must be taken to avoid injury. Vacuum treatment reduces the period of exposure and so lessens risk of damage. The treatments described effect earlier sprouting in some varieties by about a month.

1632. BURTON, W. G.

Physiological effects of the volatile products of respiring potatoes.

Nature, 1952, 169: 117, bibl. 10.

During recent work it has been shown that if the volatile metabolic products of stored potatoes were allowed to accumulate, the sprouting of potatoes was retarded. If, however, the CO_2 alone was allowed to accumulate, by removing the other volatile products, sprouting was stimulated. Sprouting was markedly retarded by scrubbing out all the CO_2 in the storage atmosphere while allowing the other volatile metabolic products to accumulate.—Ditton Laboratory, D.S.I.R.

1633. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

A home-made potato unit.

[*Publ.* N.I.A.E., 1951 [?], 1 p.]

Diagram and notes for the construction and operation of a wooden potato planter.

1634. YOUNG, R. A., AND MILBRATH, J. A.

A method of treating freshly cut seed-pieces on tuber-unit potato planters.

From abstr. in *Phytopathology*, 1951, 41: 945-6.

Excellent results against fusarium or pythium rots were obtained in preliminary trials with a tuber-unit planter on which seed pieces were cut on a vertical rotating wheel of knives and passed through a fungicide bath before being planted. Treatment with Phygon (1 lb./10 gal.) and Semesan Bel (1 lb./ $\frac{7}{8}$ gal.) resulted in marked increases in yield.

1635. SANFORD, G. B.

Effect of various chemicals on the natural healing of freshly cut potato sets.

Phytopathology, 1951, 41: 1077-82, bibl. 7.

Calcium hydrate and Spergon accelerated the incidence of external suberization and layers of wound periderm in freshly cut potato sets, and Fermate and sulphur delayed it slightly. Mercuric chloride solution (standard and acidified) delayed it during the first 3 days, and Ceresan was very detrimental. The treatment of cut potato sets with an effective fungicide, also favourable to natural healing, is suggested for replacing the present practice of disinfecting whole tubers.—Dominion Laboratory of Plant Pathology, Edmonton, Alberta, Canada.

Cultivation.

(See also 1173, 1671b.)

1636. OPSAHL, B.

Førsøk med kalkkvelstoff mot frøugras og som kvelstoffgjødsel i potet. (Experiments on the action of calcium cyanamide as a weed killer and as a fertilizer for potatoes.) [English summary 1 p.]

Forskn. Landbruk., 1951, 2: 263-75, bibl. 7, being *Med. Stat. Forsøksg. Forus* 31.

Two series of experiments were carried out comparing (1) four and (2) three treatments during the years 1946-49 and 1941-49 respectively. (1) The following fertilizer applications were made to potatoes: i, KP; ii, KP+40 kg. calcium cyanamide per 1,000 m² before planting; iii, KP+40 kg. cyanamide before emergence, viz. 2-3 weeks after planting; and iv, an equivalent amount of N applied as calcium ammonium nitrate. The data show a significant increase of tuber and dry matter yield as a result of nitrogen manuring and a significant influence of weather conditions on the magnitude of the fertilizer effect. (2) i, Normal manuring with control of weeds by cultivation; ii, normal manuring without cultivation; iii, normal manuring+30 kg. cyanamide per 1,000 m² without cultivation. The interaction between weed infestation and June temperature is complicated, but as an over-all result of this trial the application of calcium cyanamide as a fertilizer and for weed control must be regarded as economically profitable.

1637. INSTITUT D'ORGANISATION SCIENTIFIQUE DU TRAVAIL EN AGRICULTURE (I.O.S.T.A.).
Influence de quelques facteurs sur le travail des arracheuses de pommes de terre. (The effect of certain factors on the performance of potato harvesters.)
Terre maroc., 1951, 25: 195-7.

L'Institut d'Organisation Scientifique du Travail en Agriculture (I.O.S.T.A.) began a study of methods of harvesting potatoes in 1949, and a summary is given here of some of the results obtained, full details of which are to be published shortly. Comparisons are made throughout between one- and two-row lifting machines, some of the figures quoted [it is not clear which] being taken from the Maine Agricultural Experiment Station. Little difference was found in the tonnage lifted per day by one-row machines drawn by horses or by tractors. The output of 2-row machines was approximately double that of 1-row machines. Factors which affected the output of either type of machine were the length of the rows, the slope of the land, the condition of the soil whether moist or dry, the proportion of haulms that were dead, the quantity of weeds present and the presence or absence of stones.

Diseases of virus or unknown origin.

(See also 1401, 1671a, c, d.)

1638. SCHUPHAN, W., DRESSLER, D., AND SEUTHE, I.
Eine kolorimetrische Schnellmethode (modifizierter Tryptophan-Schnelltest) zur Unterscheidung gesunder und viruskranker Kartoffeln. (A quick colorimetric method (modified tryptophane rapid test) for distinguishing sound and virus-infected potatoes.)
Z. PflKrankh., 1950, 57: 408-15, bibl. 6.

The fact that virus-infected potatoes contain an abnormal amount of tryptophane affords a quick method of testing based on a quantitative xanthoprotein reaction. A modified and simplified method is described.

1639. STAPP, C., AND BARTELS, R.
Ein weiterer Beitrag zum serologischen Nachweis des X-Virus in Kartoffeldunkelkeimen. (Vorläufige Mitteilung.) (Further contribution on the serological determination of the presence of virus-X in potato sprouts germinated in the dark.) (Preliminary communication.)
NachrBl. dtisch. PflSchDienst., Braunschweig, 1951, 3: 146-7, bibl. 6.

Until recently the serological testing of sprouts germinated in the dark could be carried out only from February onwards. By applying the "rindit" treatment (ethylene chlorohydrin+ethylene dichloride+carbon tetrachloride in a 7:3:1 ratio) to break tuber dormancy, 23 potato varieties were serologically shown to contain virus-X in October 1950, and in December 29 out of 30 varieties treated at the rate of 0.25 c.c. per 1 l. [volume] were successfully examined.

1640. STAPP, C., AND BARTELS, R.
Der serologische Nachweis des X-Virus in Augenstecklingen. (Serological determination of the presence of virus-X in potato eye sprouts.)
NachrBl. dtisch. PflSchDienst., Braunschweig, 1951, 3: 117-18, bibl. 4.

As eye sprouts of various X-diseased potato varieties raised under unfavourable growing conditions showed positive reaction to serological testing, the possibility of using this method of studying eye sprouts under both favourable and unfavourable conditions has been established.

1641. ROLAND, G.
Que penser de la recherche du virus X par voie sérologique dans les germes de pommes de terre? (Notes on the determination of virus X by serological methods applied to potato sprouts.)
Parasitica, 1951, 7: 148-50, bibl. 3.

From the data recorded the author concludes that virus X can generally be detected in infected potato sprouts by the serological method, but that when a negative result is obtained by that method the absence of the virus should be checked by inoculations into *Datura stramonium* (the thorn-apple).

1642. HANSEN, F., AND HANSEN, S. E.
Undersøgelser over kartoffel virus X. I. (Studies of potato virus X. I.) [English summary 1 p.]
Tidsskr. Planteavl, 1951, 55: 136-43, being *Beretn. Stat. Forsøgsvirks. Plantekult.* 447.

In 31 out of 33 Danish potato varieties tested at least one plant of each was found to be infected with virus X when 32 plants of each variety were examined at the Danish State Experiment Station, Studsgaard. In a comparison of indicator plants *Gomphrena globosa* proved the most suitable. Characteristic symptoms appear 2-5 days after sap inoculation and, as the infection is not systemic, the same plant may be used as many times as there are leaves. *Gomphrena* shows the symptoms all the year round, though in winter artificial light is necessary to bring them out, illumination for a few hours daily by a 200-watt bulb per m² at a distance of 60 cm. being sufficient. Different X strains, including virus B, produced similar

symptoms, whereas inoculation with other potato viruses, such as A, Y, E and leaf-roll, failed to produce a response.

1643. KLINKOWSKI, M.

Ein Beitrag zur Frage der Infektionsmöglichkeit des X-Virus der Kartoffel bei Wurzelkontakt. (The possibility of infection of potatoes by the X-virus through root contact.

Z. PflKrankh., 1951, 58: 3-6, bibl. 4.

The author concludes that infection by the X-virus can occur underground, presumably by root contact.

1644. BERCKS, R.

Weitere Untersuchungen zur Frage der Altersresistenz der Kartoffelpflanzen gegen das X-Virus. (Further work on the influence of age on X-virus resistance in potatoes.)

Phytopath. Z., 1951, 18: 249-69.

Infection experiments with the potato X-virus from various potato varieties on the varieties Flava and Capella show, as in earlier experiments (*H.A.*, 20: 1752 and 21: 3701) with other viruses, that there is an "age-resistance", the earlier inoculations yielding more infections than later ones. Experiments on manurial plots show that virus infection is dependent on nutrition, in that ill-nourished plants are not infected to the same degree as are plants normally manured.

1645. LUNDEN, A. P.

Virussykdommer på potet. Virkningen av virus X (*Solanum virus 1*) på avkastnings-evne, tørrstoffinnhold, m.m. og bekjempelsen av dette virus gjennom oppformering av virusfrie stammer og gjennom foredlingsarbeidet. (Potato virus diseases. The effect of virus X (*Solanum virus 1*) on yield and dry matter content and its control by raising healthy "seed" and by breeding resistant varieties.) [English summary 2 pp.] *Forskn. Landbruk.*, 1951, 2: 140-56, bibl. 41, being *Meld. Åkervekstfors. Norg. LandbrHøgsk.* 139.

An examination of Norwegian potato varieties showed that the percentage of virus X infection is extremely high. In a 3-year trial carried out with one variety at the Norwegian College of Agriculture the depression in yield due to virus X infection was found to be 11% (14% in the last year), although the virus strain in question was so mild that hardly any visible symptoms appeared. Dry matter content was not affected, tuber size was only slightly reduced and the vitamin C content of infected tubers in February was 7.1 mg., as compared with 8.4 mg. in healthy tubers. Methods of raising healthy seed potatoes and first results of Norwegian work on the breeding of virus X resistant varieties are discussed.

1646. KLINKOWSKI, M.

Die Wirkung des X-Virus auf den Ertrag der Kartoffelsorten Ackersegen und Voran. (The effect of X-virus on the yield of potato varieties Ackersegen and Voran.)

Z. PflKrankh., 1951, 58: 241-5, bibl. 12.

Earlier work on the subject is reviewed and then data are given to show the marked depression in number of tubers and tuber weight in virus-infected plants of the varieties Ackersegen and Voran.

1647. RICH, A. E.

Studies on phloem necrosis of Irish potato tubers in Washington.

Bull. Wash. St. agric. Exp. Stats 528, 1951, pp. 49, bibl. 141.

By phloem necrosis is meant the network of broad, threadlike strands of dead phloem tissue in tubers originating at the stem end and extending to the apex. A review of the literature is followed by a survey of conditions in Washington. Stand and yield are seriously affected by the incidence of this virus disease in certain varieties. Its incidence is found to be closely correlated with the current season's spread of leaf roll. Control measures include planting leaf roll-free seed in isolated plots, the adoption of an adequate agricultural control programme, or the use of some of the [never] resistant varieties.

1648. Coïc, Y.

La filosité de la pomme de terre. (Hair sprout of potatoes.)

Pomme de Terre franç., 1952, 15: 149: 3-5, bibl. 6.

A review of work on the cause of hair sprout, a problem as yet unresolved. [See also *H.A.*, 22: 652.]

Bacterial and fungous diseases.

1649. FERNANDO, M., AND STEVENSON, G.

Studies in the physiology of parasitism. XVI. Effect of the condition of potato tissue, as modified by temperature and water-content, upon attack by certain organisms and their pectinase enzymes.

Ann. Bot. Lond., 1952, 16: 103-14, bibl. 6.

1. Certain bacteria which are normally termed saprophytic, viz. *Bacillus subtilis* and *B. megatherium*, are able to parasitize living potato tissue at a suitably high temperature or when the tissue is injected with water. 2. Within the group of four bacteria tested, there is a correlation between capacity to attack potato tissue and amount of pectinase enzyme excreted under standard conditions. 3. A qualitative difference between the pectinase enzymes of *Botrytis cinerea* and *Bacterium carotovorum* has been demonstrated. Preparations of the bacterial enzyme, which when tested on turgid potato discs of standard thickness were found to be weaker than *Botrytis* enzyme, were able to attack normal (subturgid) potato tissue, whereas the *Botrytis* enzyme failed to do so. No explanation of this difference is yet forthcoming. It does not seem to rest upon osmotic differences between the two enzymic preparations. 4. Rate of diffusion appears to be a limiting factor in the attack of potato tissue by preparations of pectinase enzyme. [Authors' abstract—*Imp. Coll. Sci. Technol.*, London.]

1650. STAPP, C.

Fortgeführte Untersuchungen über die Widerstandsfähigkeit deutscher Kartoffelsorten gegen den bakteriellen Erreger der Schwarzbeinigkeit und Knollennassfäule. (Examination of the resistance of German potato varieties to the bacterial causal agent of black leg and tuber rot.)

NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 185-7, bibl. 4.

Of the 22 newer varieties tested 3 proved resistant to *Bacterium phytophthorum*, 6 moderately resistant, while the rest were found from mildly to very highly susceptible. It was shown once more than no relationship exists between yellow flesh colour and susceptibility, as was assumed earlier, neither was any correlation established between season of maturity and resistance, though generally early varieties did appear more susceptible than late ones.

651. VLITOS, A. J., AND HOOKER, W. J.

The influence of sulfur on populations of *Streptomyces scabies* [potato scab organism] and other Streptomycetes in peat soil. *Amer. J. Bot.*, 1951, 38: 678-83, bibl. 23, being *J. Pap. la agric. Exp. Stat. J-1885*.

The following problems were investigated: (1) whether soil populations of *Streptomyces* spp., as indicated by filtration plate techniques, could be used as a means of estimating the incidence of potato scab; and (2) at what time the influence of sulphur on populations of *Streptomyces* spp. become measurable.

1652. GARBER, R. H., SCHAAL, L. A., AND FULTS, J. L.

The selective action of pentachlorophenoxyacetic acid against *Streptomyces scabies* (Thaxt.) Waksman and Henrici in culture media. *Phytopathology*, 1951, 41: 991-6, bibl. 9, illus.

The growth of *Streptomyces scabies* No. 128 in a potato-dextrose agar medium was limited by pentachlorophenoxyacetic acid at concentrations of 32 and 64 p.p.m., and was inhibited at 125 p.p.m. Preliminary field tests in the northern Colorado potato-growing area indicate that pentachlorophenoxyacetic acid used as a soil fungicide reduces potato scab disease caused by *Streptomyces scabies*.—Colorado A. & M. Coll., Fort Collins, Colorado.

1653. KAMMERMAN, N.

Undersökningar rörande potatisbladmöglighet *Phytophthora infestans* (Mont.) de By. II.* Sambandet mellan potatisbladsaftens peroxidaktivitet och *Phytophthoraresisten*sen. (Investigations on potato blight. II. The relationship between the peroxidase activity of the leaf and *phytophthora* resistance.) [German summary 6 pp.] *Medd. Växtskyddsanst. Stockh.* 58, 1951, pp. 32, bibl. 8.

A relationship is shown to exist between peroxidase activity and *phytophthora* resistance of *Solanum tuberosum* varieties. Potatoes with high peroxidase activity are usually relatively resistant, those with low peroxidase activity susceptible. There are exceptions to this general rule, due probably to other factors. The immune *S. demissum* plants and its hybrids did not exhibit any especially high peroxidase activity. The resistance of some varieties to certain physiological races of the fungus coupled with susceptibility to others is considered. The correlation is not considered reliable enough for the determination of blight resistance of new varieties.

* For I, see *H.A.*, 21: 1734.

1654. MÜLLER, K. O., AND MUNRO, J.
The reaction of virus-infected potato plants to *Phytophthora infestans*.
Ann. appl. Biol., 1951, 38: 765-73.

The growth of *Phytophthora infestans* was retarded on leaves of potato plants that had been artificially inoculated with virus X or with virus Y. The development of the fungus was never increased by virus infection. It is suggested that virus infection alters the nutritional status of leaves to one less favourable to the fungus.—National Institute of Agricultural Botany, Cambridge.

1655. KEYWORTH, W. G.
Verticillium wilt disease of the potato.
Frontiers Plant Sci., 1951, 4: 1: 3, illus., being *A.R. Conn. agric. Exp. Stat.* New Haven.

Outbreaks of verticillium wilt (*V. albo-atrum*) in potato fields in the Connecticut Valley are reported. In some fields this trouble has affected only a few scattered plants but often in others almost the whole crop has wilted and died. The symptoms are described. As several other crop plants in Connecticut are susceptible, notably eggplant, tomato, strawberry, raspberry and cucumber, these should be avoided in crop rotations with potatoes; suitable crops are tobacco, maize, forage crops and brassicas. Certified seed is inspected for the presence of verticillium and should be reasonably free from the disease. The very susceptible Kennebec variety should be avoided in affected fields.

1656. MILLER, P. R.
Use of chemicals in eradication of potato wart.
Agric. Chemls, 1951, 6: 12: 65, 67, 69, illus.

Factors affecting the spread of wart disease are discussed. In Pennsylvania finely pulverized copper sulphate at the rate of 2,500 lb. per acre and/or a 5% solution of 40% formaldehyde at the rate of 20 gal. per 100 sq. ft. were found to be the most effective wart eradicators. A long-term programme, which should eliminate the disease from the State by 1957, is set out in some detail.

Nematodes.

1657. CHITWOOD, B. G.
The golden nematode of potatoes.
Circ. U.S. Dep. Agric. 875, 1951, pp. 48, bibl. 61, illus.

After a history of the disease in Europe and in the U.S.A., the nematode, *Heterodera rostochiensis*, is described, and discussed under the headings: host-parasite relations, survey methods, dispersal of the organism, nature of populations, relation of disease to soils and fertilizer, control. Once soil has become infested with this nematode it is possible to grow satisfactory crops only where the infestation is light. The number of larvae in the soil can be controlled by crop rotation or soil fumigation. If the number is small enough, rotations that include potatoes every third year can be used, but if very large, a satisfactory crop can be grown only every fifth or sixth year. Soil fumigation is effective and one satisfactory crop can be grown if the soil is fumigated with two applications of 23½ gal. of dichloropropene-dichloropropane mixture

or 20% (by volume) ethylene dibromide mixture per acre, the soil being turned over in the interval between applications.

1658. FENWICK, D. W.

The effect of temperature on the development of the potato-root eelworm, *Heterodera rostochiensis*.

Ann. appl. Biol., 1951, 38: 615-17, bibl. 1.

Temperatures above 20° C. slightly reduce penetration of larvae of the potato-root eelworm into the potato root and greatly restrict their development in the plant tissue. The temperature range of this parasite is compared with that of *H. marioni*, and a possible relationship to their geographical distribution is discussed.—Rothamsted Experiment Station.

1659. GOFFART, H.

Zur Frage der Verwendbarkeit von E605 in der Nematodenbekämpfung. (The use of E605 in nematode control.)

NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 164-7, bibl. 4.

Trials have shown E605 to be uneconomical for the control of soil nematodes attacking potatoes. Against leaf nematodes, however, repeated treatments at approximately 0.03% concentration were promising.

1660. ELLENBY, C.

Mustard oils and control of the potato-root eelworm, *Heterodera rostochiensis* Wollenweber: further field and laboratory experiments.

Ann. appl. Biol., 1951, 38: 859-75, bibl. 18.

Allyl isothiocyanate, already shown to be effective against the potato eelworm [*Ann. appl. Biol.*, 32: 237-9; *H.A.*, 16: 964c], is compared with two similar substances; one, phenyl isothiocyanate, is synthetic, the other, phenethyl isothiocyanate, occurs in the roots of many crucifers, including black mustard. In hatching experiments, various concentrations of each of these oils in potato-root excretions are used to stimulate eelworm cysts. The earlier results with allyl isothiocyanate are confirmed, and it is shown that the emergence of larvae decreases with increasing concentration of oil.—Univ. of Durham, Newcastle-upon-Tyne.

Insect pests.

1661. LANGENBUCH, R.

Über das Eindringvermögen des Hexachlorcyclohexans in das Kartoffelblatt. (The penetration of HCH into the potato leaf.)

NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 118-22, bibl. 11, illus.

The penetrating power of HCH and its effect on the aphid *Aulacorthum solani* was demonstrated in laboratory trials at the Colorado beetle Research Institute, Darmstadt. HCH was absorbed faster and in greater quantities by the lower than by the upper side of the leaf. In comparative tests, treating the upper surface with the usual concentrations, E605 f was absorbed most readily, followed by HCH, while Gesarol 50 did not seem to penetrate the leaf tissue.

1662. HORBER, E.

The control of the Colorado beetle (*Leptinotarsa decemlineata* Say) in Switzerland from 1945 to 1949.

Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 221-5.

The spread of Colorado beetle, and the administration, techniques and costs of control measures are described. Of the chemicals used, 50% DDT wettable powder, combined with a fungicide for the simultaneous control of potato blight, was found most satisfactory in heavily infested areas, calcium arsenate where the attack was moderate, and in the mildly infested areas hand-picking of beetles and grubs was still practised.

1663. LANGENBUCH, R.

Quantitative Untersuchungen über die Frassgiftwirkung des Hexachlorcyclohexans und des DDT. (Quantitative examination of the stomach poison action of HCH and DDT.)

NachrBl. dtsh. PflSchDienst., Braunschweig, 1951, 3: 177-85, bibl. 29, illus.

During warm dry weather in the spring of 1950 a potato field heavily infested by Colorado beetles was treated with an approved proprietary hexa preparation without any apparent effect. Examinations revealed that the beetles had not yet begun to feed, and the contact and gaseous effect of the chemical was inadequate for any appreciable reduction of their numbers. Extensive studies at the Colorado Beetle Research Institute, Darmstadt, have shown that the beetles need a certain amount of water intake before they start feeding after spring emergence, i.e. before a stomach poison becomes effective. Other factors detrimentally affecting the action of insecticides include cool weather, large particle sizes, lack of penetration and the deterrent action of some dust carriers and emulsifiers.

1664. BESEMER, A. F. H., FRANSEN, J. J., AND ORMEL, H. A.

Korte mededelingen over een proef met druknevelsput en vliegtuig ter bestrijding van de Coloradokever. (Control experiments against the Colorado beetle by low volume spraying with a fixed wing plane and with ground equipment.) [English summary 14 lines.]

Reprinted from *Maandbl. LandbVoorld*, 1951, 8: 236-41 as *Meded. Inst. PIZiekt. Onderz.* 20, 1951.

Insecticide was sprayed in low volume by fixed wing aeroplane and by atomizer. Both methods of application proved successful provided the spray liquid was sufficiently dispersed. Not less than 20-25 litres spray liquid per hectare is necessary. Toxaphene and DDT, the latter in three different carriers, were used.

1665. WALLIS, R. L.

Potato psyllid selection of host plants.

J. econ. Ent., 1951, 44: 815-17, bibl. 3.

The two important plants in the Colorado Wyoming-Nebraska area, upon which the psyllid, *Paratrioza cockerelli*, could multiply and spread to potato and tomato crops are horse nettle (*Solanum carolinense*) and wild groundcherry (*Physalis lanceolata*). Other hosts both wild and cultivated are not considered of great consequence as their distribution is limited in the area.

666. LLOYD, G. W.
Insecticide tests against the potato tuberworm.
J. econ. Ent., 1951, 44: 613-14, bibl. 3,
being *Pap. Md agric. Exp. Stat. A319*,
Contr. 2279.
A note describing control trials with various insecticides
applied by direct dusting of tubers, spraying the inside
of storage boxes and impregnating storage bags.

667. FIORI, G.
Danni ai tuberi di patata da *Vesperus*
luridus. (Potato tubers damaged by *Ves-*
perus luridus.)
Inform. fitopat., 1951, No. 5, pp. 7-8, illus.
Severe injuries to potato tubers in Italy caused by the
larvae of *Vesperus luridus* are described and illustrated.

Quality.

1668. VANASSE, N. A., JONES, I. D., AND LUCAS,
H. L.
Specific gravity-dry matter relationship in
potatoes.
Amer. Potato J., 1951, 28: 781-91, bibl. 5.
In trials in N. Carolina place of production and
variety had a statistically significant effect on the
specific gravity-dry matter relationship in the tuber.
Size of tubers had no significant effect.

1669. PAYNE, M. G., FULTS, J. L., AND HAY,
R. J.
Free amino acids in potato tubers altered by
2,4-D treatment of plants.
Science, 1951, 114: 204-5, bibl. 17.
In this work at the Colorado Agricultural Experiment
Station 2,4-D treatment of Red McClure potato tubers
resulted in a significant decrease in the content of 7 out
of 8 amino acids identified in the concentrated filtrate
from those potatoes. The exception was glutamic acid,
which increased significantly.

1670. KIRKPATRICK, M. E., MOUNTJOY, B. M.,
AND ALBRIGHT, L. C.
Flavor and odor of cooked potatoes as
affected by use of lindane and benzene
hexachloride as insecticides.
Amer. Potato J., 1951, 28: 792-9, bibl. 16.
Palatability tests with Irish Cobbler variety in Virginia

and Katahdin in Maryland showed that the application
of both 1 lb. lindane per acre and about 8 lb. technical
benzene hexachloride (1 lb. gamma isomer) to the
soil before planting gave an objectionable odour to
cooked potatoes. The flavour was also adversely
affected. When only $\frac{1}{4}$ lb. lindane was applied the
odour and flavour were detectable but slight.

Noted.

1671.
a DARBY, J. F., LARSON, F. H., AND WALKER,
J. C.
Variation in virulence and properties of
potato virus Y strains.
Res. Bull. Wis. agric. Exp. Stat. 177,
1951, pp. 32, bibl. 43, illus.
b GRANCINI, P.
Recenti progressi della produzione delle
patate da semina in una zona della Germania
occidentale. (Recent progress in seed
potato production work in the Uelsen
district of Western Germany.) [English sum-
mary 10 lines.]
Ann. Sper. agrar., 1951, Vol. 5, No. 6,
Suppl., pp. lxxix-lxxx.
c MINISTRY OF AGRICULTURE.
Potato virus diseases.
Adv. Leaflet. Minist. Agric. Lond. 139, 1951,
pp. 8, illus.
In particular leaf roll and rugose mosaic.
d MÜNSTER, J.
Considérations sur l'évolution des pucerons
vecteurs des maladies à virus de la pomme
de terre. Résultats des dénombrements de
1950 comparés à ceux des années précéden-
tes. (The evolution of aphid vectors of
potato virus diseases. Results of counts
in 1950 compared with those of earlier
years.)
Landw. Jb. Schweiz., 1951, 65: 443-60,
bibl. 14.
e WALLACE, J. C.
Potatoes.
Bull. Minist. Agric. Lond. 94, 2nd edition
reprinted 1950, pp. 43, 1s.

TOBACCO.

General.

(See also 1141, 1174, 1672, 2010, 2028.)

1672. VAN ROOYEN, C. F.
The cultivation of tobacco.
Fmg S. Afr., 1951, 26: 363-4.
A general instructional article covering soil preparation,
transplanting and cultural operations. A.C.S.
1673. TOMLINSON, F. R.
Economic study of flue-cured tobacco
farming in the Western-Transvaal irrigation
area.
Bull. Dep. Agric. S. Afr. 318, 1951, pp. 45,
6d.

The investigation was made on 100 tobacco farms with
the aim of determining the cost of production of
flue-cured tobacco, and of making an analysis of the
factors which determine the financial results of the
farms and cost and profit in tobacco production.
[See also *H.A.*, 21: 1792.]

1674. CARALL-WILCOCKS, E. E.
Kasungu tobacco.
Colon. Devel., 1950, 1: 3: 18-19, illus.,
from abstr. in *DocumBl. trop. Prod. Amst.*,
1951, 6: 528.
An account of tobacco culture in the Kasungu district
of the central province of Nyasaland.

1675. DE RANCOURT, E.
La tabac en Union indienne. (Tobacco in India.)

Rev. int. Tabacs, 1951, 26: 221/2: 129-30, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 528.

Deals with tobacco growing in India, types and varieties grown, exports and the quality of Virginia tobaccos.

1676. GUTIERREZ, M. E.
Sumatra wrapper tobacco culture.
Philipp. J. Agric., 1950 (published 1951), 15: 201-17, illus.

Detailed advice is given on many aspects of Sumatra wrapper tobacco culture in the Philippines, including climatic and soil requirements, varieties, the Sarunayan intensive method of cultivation and the Sumatra method. Information is also given on harvesting, curing, fermentation, classification and baling.

1677. LARSEN, A., AND BAGGE, H.
Dyrknings- og opbevaringsforsøg med tobak til nikotinfremstilling 1943-1948. (The cultivation and storage of tobacco for the production of nicotine. Trials 1943-1948.)
Tidsskr. Planteavl, 1951, 55: 82-100, being *Bereth. Stat. Forsøgsvirks. Plante kult.* 444.

Of the 3 *Nicotiana rustica* strains tested at Aarslev, and on a smaller scale at Fossevangen near Tylstrup, the strain N.R.T. 61 gave the highest nicotine yield; its cultivation for nicotine production is therefore suggested. Among recommendations based on these experiments are the following: Stop the plants when the first buds appear and keep the axillary shoots short; apply a generous dressing of nitrogen, at least 1,200 kg. calcium nitrate per hectare; store the green leaf after shredding in cement basins until the extraction is carried out.

Varieties and breeding.

1678. GUTIERREZ, M. E., AND BAYUBAY, S.
Botanical descriptions of tobacco varieties grown at the Central Experiment Station, Manila (1949-1950 season).
Philipp. J. Agric., 1950 (published 1951), 15: 77-99, bibl. 5, illus.

Detailed botanical descriptions are given of 5 cigar filler varieties, 2 cigar wrapper varieties, 15 aromatic varieties comprising 9 Virginia types, 3 white Burley, and 3 Turkish, and one miscellaneous type selected as breeding stock for wilt resistance.

1679. WHITE, F. H.
Tobacco breeding in Canada.
Reprinted from *Z. Pflanzenzücht.*, 1951, Vol. 30, No. 1, pp. 3, bibl. 3.

The breeder has a very large choice of material at his disposal based on *N. silvestris* and *N. tomentosiformis* hybrids. Most of the programme involves the development of new strains through hybridization and selection. Four or five outstanding varieties, as established by varietal tests, are selected in each of the flue-cured, burley, dark and cigar types and a breeding programme built round each variety. Aims include resistance to black rootrot and earliness. Standardization and

classification plots segregate promising varieties and all new strains are tested against the best established standard strains.

Soils and manuring.

(See also 1692e.)

1680. RIGG, T., AND CHITTENDEN, E. T.
Classification of land in the Waimea County, Nelson, for flue-cured tobacco.
N.Z. J. Sci. Tech. Sec. A, 1951, 33: 1: 30-6.

Some 50,000 acres of alluvial land in Waimea County, Nelson, New Zealand, have been surveyed and classified as to potential value for flue-cured tobacco. Soil texture, drainage and the nature of the parent material from which the soils are derived are important factors. Fine sands and sandy loams of good depth are the most suitable soils for flue-cured tobacco under Nelson climatic conditions.—Cawthron Institute, Nelson, N.Z.

1681. VAN ROOYEN, C. F.
Soil types and fertilizers for Virginian tobacco.
Fmg S. Afr., 1951, 26: 297-302.

General advice is given on the use of available fertilizer mixtures for different types of soil. The particular need for avoidance of high nitrogen content in the soil is stressed; organic manures where necessary should be applied to some other crop in the rotation. The substitution, except in poor land, of the Orinoco for the Amarelo type of flue-cured tobacco is strongly recommended. A.C.S.

1682. FAGUNDES, A. B., AND OTHERS.
Ensaio de adubação de fumo na zona de mata de Minas Gerais. (Tobacco fertilizer experiments in the forest zone of Minas Gerais.) [English summary 1 p.]
Bol. Serv. nac. Pesq. agron. Rio de J. 6, 1950, pp. 39, bibl. 11.

A tobacco fertilizer experiment was carried out over the period 1945-49 at the Pomba Agricultural Experiment Station in the forest zone of Minas Gerais, Brazil. The results indicated that the application of farmyard manure alone, at the rate of 10 tons per ha., could raise the production of dried tobacco leaves from 202 to 540 kg. per ha., while the application of chemical fertilizers alone could raise production to 1,372 kg. per ha. The highest yields were obtained with a combination of the two. The N and P requirements were found to be higher than those for K. Based on the results of this experiment, the following fertilizer recommendation is made for this district: 300 kg. chilean nitrate, 400 kg. superphosphate, 150 kg. potassium chloride and 10 tons farmyard manure per ha.

Pests and diseases.

1683. SMITH, A. J., AND VAN DER MERWE, G.
Control of insect pests and plant diseases in tobacco seedbeds.
Fmg S. Afr., 1951, 26: 315-16.

Various methods of soil sterilization are detailed and reviewed as are methods of preventing infection. Steam sterilization is most favoured, particularly since eelworm, the most important pest, is controlled by it

as also the black root rot and damping-off seedbed diseases. Use of a dust mixture containing 2½% DDT as insecticide (to control both chewing and sucking insects) and 5% copper plus 25% sulphur as fungicides is recommended for seedbed treatment. A.C.S.

1684. LIMASSET, P., AND CORNUET, P.

Étude de la corrélation entre l'âge des organes aériens et la quantité de virus contenue dans ces derniers chez le tabac infecté par le virus de la mosaïque du tabac (*Marmor tabaci* (Orton) Holmes). (Correlating the age of aerial organs and the quantity of virus in them in tobacco plants infected by tobacco mosaic virus.)

Ann. Épiphyt., 1950, 1 (n.s.): 274-85, bibl. 17.

The observations of previous workers are discussed, and the authors' results are described and shown in graphs. In testing leaves of infected tobacco plants it was shown that virus content in apical leaves is low, that it increases to about the fifth leaf down, and then decreases in the lower leaves.

1685. RYŽKOV, V. L.

The effect of amino acids and related compounds on the reproduction of the tobacco mosaic virus. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 80: 677-9.

The degree of suppression of the development of tobacco mosaic virus in leaves of *Nicotiana glutinosa* and *N. tabacum* by amino acids and analogous substances is tabulated and discussed.

1686. VIDALI, A.

Esperienze di lotta contro l'oidio del tabacco (*Erysiphe cichoriacearum*) effettuate in campo a mezzo di carbonato di litio. (Experiments on the control of tobacco powdery mildew in the field by lithium carbonate.)

Not. Mal. Piante, 1951, No. 16, pp. 35-9.

The favourable results obtained in the previous year (*H.A.*, 21: 3754) in pot experiments were not confirmed.

1687. STEINBERG, R. A.

Occurrence of *Bacillus cereus* in Maryland soils with frenched tobacco.

Plant Physiol., 1951, 26: 807-11, bibl. 12.

Samples of soils growing normal and severely frenched tobacco and of normal and frenched roots were collected on seven different southern Maryland farms during the summer of 1950, and the populations of *Bacillus cereus* Fr. & Fr. were determined. In six of seven paired samples of rhizosphere soil, higher populations of *B. cereus* were found for the frenching soil than were found in normal soils. The average *B. cereus* population of the frenching soils was 1.65 times that of normal soils. Roots of frenched tobacco showed especially large populations of *B. cereus*, with values several times those hitherto reported for normal plant roots. The probability that *B. cereus* bears some causal relationship to frenching of tobacco is discussed. [Author's summary.]—Bur. Plant Ind., Beltsville, Md.

1688. DOMINICK, C. B.

Tests with insecticides for hornworm control on tobacco.

J. econ. Ent., 1951, 44: 539-41, bibl. 2.

Of the two species of hornworm damaging tobacco, the tomato hornworm, *Protoparce quinquemaculata*, was the more prevalent in these trials. Applications of TDE, toxaphene, TM-1 and DDT resulted in satisfactory control of the first brood hornworms, and later dust applications of TDE, TM-1 and toxaphene were effective against the second brood. Toxaphene plus parathion and DDT plus parathion dusts gave effective control of tomato hornworm and green peach aphid.

Composition.

(See also 1692d.)

1689. BACON, C. W., WENGER, R., AND BULLOCK, J. F.

Biochemical changes in tobacco during flue curing.

Tech. Bull. U.S. Dep. Agric. 1032, 1951, pp. 37, bibl. 27.

The biochemical changes that occurred in 16 constituents of flue-cured tobacco during the curing process were determined. It was found that the outstanding changes in composition were in the carbohydrate group. An average original value of about 29% of starch was reduced to about 12% when the leaf was yellowed and to about 5% when cured. The other constituents which decreased were pectic acid and resins. There was an increase of about 10% in the free reducing sugars, 4% in levulose and 5.5% in sucrose. Minute changes took place in crude fibre, total N, protein N, nicotine, ash, oxalic acid, citric acid, and malic acid, while the calcium content and pH value remained unaltered.

1690. RAMAMOORTHY, B., AND OTHERS.

A rapid routine method for the estimation of nicotine in tobacco.

Nature, 1952, 169: 112, bibl. 2.

"With the view of estimating the nicotine content in tobacco species grown in India, particularly in those of low nicotine content obtained in grafting experiments, a rapid semi-micro method of distillation followed by a spectrophotometric method of estimation have been developed." The results of the method, which is described, agree fairly well with those of the standard method.—Indian agric. Res. Inst., New Delhi.

1691. OLLERO GOMEZ, A., AND COTA GALAN, R.

Estudios sobre selección de plantas de tabaco por su contenido en nicotina. I. Metodo quimico para determinar el alcaloide. (The selection of tobacco plants for nicotine-content. I. A chemical method.) [English summary ½ p.]

Bol. Inst. Invest. Agron. Madrid, 1951, 11: 24: 1-27, bibl. 9.

A method is proposed based on colorimetric

determination of the alkaloid in dilute extracts of immature tobacco samples.

Noted.

1692.

a ANON.

La culture du tabac dans les territoires français d'outre-mer. (Tobacco culture in the French colonies [Algeria and Madagascar].)

Rev. int. Tabacs, 1951, 26: 218: 65-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 332.

b BADGETT, C. O., AND WOODWARD, C. F. Extraction of "essence" from tobacco stems.

[*Publ.*] *U.S. Dep. Agric. A.I.C.* 298, 1951, pp. 10, bibl. 37.

A fragrant fraction with characteristic tobacco aroma.

c GIOVANNONZZI, M.

Contributo italiano nel campo degli studi e della tecnologia della fermentazione dei tabacchi. (Italian contribution to the study of tobacco fermentation.)

Le Tabac, 1950, 7: 199-205, (French text pp. 206-12), from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 333.

d JEFFREY, R. N.

A comparison of various analytical methods on tobacco containing non-nicotine alkaloids.

J. Ass. off. agric. Chem. Wash., 1951, 34: 843-51, bibl. 13.

e RICHARD, J.

Les sols de tabac à cigare du Québec. (The cigar-tobacco soils of Quebec.)

Rev. d'Oka, 1951, 25: 163-6.

The properties of 9 series are described.

MISCELLANEOUS TEMPERATE AND TROPICAL CROPS.

(See also 2026, 2029.)

Aromatics and essential oils.

1693. NARODNY, L. H.

Spices and essential oils in the Windward Islands.

Chemist and Druggist, 1951, 155: 622-3, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 400-1.

The most important spice and oil crops produced are nutmegs and nutmeg oil in Grenada, ginger and pimento in Jamaica and vanilla in Dominica. There are good possibilities in Dominica for the production of cloves, camphor, cinnamon and essential oils, including citrus oil.

1694. ANON.

Camphor research, India.

Foreign Commerce Wkly, 1951, 42: 6: 20, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 309.

Trials with *Ocimum kilimandscharicum* are being carried out at the Dehra Dun Research Station, India.

1695. DHINGRA, D. R., AND OTHERS.

Otto of *Pandanus odoratissimus* L. or Kewda. Results of preliminary experiments.

Perfum. ess. Oil Rec., 1951, 42: 114-15, 117, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 373.

Data on characteristics, composition and uses of the essential oil and distribution of the plant in Asia.

1696. DIETZ, S. M., STEENLAND, A. P., AND HORNER, C. E.

Mint rust (*Puccinia menthae*) epiphytotic in the Northwest.

From abstr. in *Phytopathology*, 1951, 41: 938.

Mint rust caused 25% reduction in oil yield in Columbia County, Oregon, in 1949, and by 1950 it had spread to

all the mint-growing areas in the State. Methods of control which have given the best results are such cultural practices as completely covering infected stubble by autumn ploughing, disking back furrows and headlands, and removal of volunteer mint plants surrounding the mint fields by spraying early in the spring with Dinitro followed by an application of 2,4-D.

Bamboos.

1697. KIRBY, R. H.

Tonkin canes and rattans.

World Crops, 1951, 3: 5-7, 13, bibl. 9, illus.

Although the bamboo, *Arundinaria amabilis*, the culms of which provide Tonkin canes, is superior to all other bamboos because of its combination of straightness, stiffness, toughness, smooth joints and relative lack of taper, it is only grown in one small district of China. Its propagation, cultivation, flowering, harvesting, scouring, straightening and grading are described. A similar account is given of rattans, the stems of climbing palms, notably species of *Calamus* and *Daemonorops*. These are commonly obtained from wild plants in several parts of the Far East, and attempts to use related species found in West Africa have generally yielded inferior products. Brief descriptions are given of the grading and processing of rattans, including *Calamus scipionum* which furnishes Malacca canes, and of the cultivation of *C. caesioides* in Borneo.

Drugs.

(See also 1722b, 1905, 1906.)

1698. BURG, J. P. L. L. A.

Geneeskrachtige en aromatische gewassen en hun toekomst. (Medicinal and aromatic herbs and their future in the Netherlands.) [English summary 9 lines.]

Meded. Dir. Tuinb., 1951, 14: 557-64, illus.

Research in this field in the Netherlands is being organized with the help of the Ministry of Agriculture. Co-operative societies of herb growers run dehydration plants and organize sales.

1699. HAVAS, L. J., AND BALDENSBERGER, A.
The oncological aspect of the "immunity" of *Colchicum* to colchicine.
Science, 1951, **114**: 208-10, bibl. 11.

The susceptibility of *colchicum* to colchicine, which has been doubted by many, is confirmed by the work of two workers at Guebwiller, France.

1700. ŠANTAVÝ, F., AND COUFALÍK, E.
Substanzen der Herbstzeitlose und ihre Derivate. XXIV. Isolierung von Substanzen aus den Knollen verschiedener Arten der Pflanzenfamilie Liliaceae. (*Colchicum* compounds and their derivatives. XXIV. Isolation of substances from the tubers of various species of the family Liliaceae.)
Coll. Czech. chem. Commun., 1951, **16**: 198-203, bibl. 14, illus.

Colchicine was isolated from the tubers of *Colchicum agrippinum*, *C. vernum*, *Merendera sobolifera* and *M. attica*. Small amounts of substance I and J were isolated from *C. vernum* and *M. attica*. Raw sugar was isolated from *M. sobolifera* and *M. attica*. No colchicine was found in *Tulipa silvestris*.

1701. SPOON, W.
Agar-agar. [English summary $\frac{1}{2}$ p.]
Reprinted from *Cacao Chocolate Suikerverwerken*, 1951, **19**: 8: 139, as *Ber. Afd. trop. Prod. roy. trop. Inst., Amst.*, **234**, 1951, pp. 8, bibls.

Indications are given that it may be possible to produce satisfactory agar in Indonesia.

1702. THOMAS, C. A.
Anthracnose of *digitalis*.
Phytopathology, 1951, **41**: 997-1000.
Anthracnose of *Digitalis lanata* (*Colletotrichum fuscum*) can be avoided by using disease-free seed. A hot-water treatment, 55° C. for 15 min., gave control on naturally infested seed.—Plant Industry Stat., Beltsville, Maryland. [For previous abstract, see *Ibidem*, 41: 35; *H.A.*, 21: 2794.]

1703. ŠAMŠURIN, A. A.
Lagochilin, a valuable new alkaloid. [Russian.]
Priroda, 1951, **40**: 7: 57, bibl. 3.

The preparation and the haemostatic properties of lagochilin, an alkaloid obtained from *Lagochilus inebrias*, a plant found in Uzbekistan, are described.

1704. NOLTE, H.-W.
Die Kapselvergilbung des Mohns. Eine Gallwespe als neuer deutscher Mohnschädling. (Capsule yellowing of poppy. A gall wasp as a new German poppy pest.)
Z. PflKrankh., 1951, **58**: 89-92, bibl. 8, illus.

Damage caused by larvae of a gall wasp to [opium] poppies in Germany is described. The larvae tunnel the stems and this results in premature ripening and yellowing of the capsules. The nature of the damage suggests that the pest is *Timaspis papaveris*.

1705. ROLAND, G.
Notes sur deux affections d'*Hyoscyamus niger* L. (Notes on two diseases of henbane.)
Parasitica, 1951, **7**: 151-2, illus.

Two diseases of henbane are described; one is mosaic caused by virus Y (*Solanum virus* 2), the other a wilt caused by *Fusarium* sp.

Fibres.

1706. CASTAGNOL, E., AND PHAM-GIA-TU.
Étude des textiles du nord de l'Indochine. (Fibre investigations in north Indo-China.)
Arch. Inst. Rech. agron. Indochine **6**, 1950, pp. 35, illus.

This paper which reports on a variety of technical and chemical investigations, is divided into two parts. The first is devoted to jute and 32 substitutes for jute. The percentage of fibre yielded by these and details of their composition are tabulated and clear photomicrographs are given of sections of several of them. Investigations are described on the retting and cleaning of several of these fibres, notably *Mallotus apelta*. The second part is devoted to ramie and other urticaceous plants. *Extraction of ramie fibre.* A new chemical method has been evolved as a substitute for retting and degumming. Undecorticated strips of rind are boiled for 2 hours twice in succession in lime water, washed and rinsed in cold water, boiled for half an hour in 1% sodium carbonate, washed again, treated for 5 hours with a cold solution of calcium chloride at 1% Cl, and finally washed again before stripping, combing, etc. *Nutrient requirements of ramie:* Analyses of leaves, rind and pith show very high Ca contents and fairly high N. The highest proportions of these elements occur in the leaves, which, with the pith, makes up 84.5% of the total material removed at a cutting, and it is suggested that they should be composted and returned to the land. *Manuring of ramie:* On land where ramie had grown poorly, green manuring and the application of lime more than doubled the height of the plants and markedly increased the size of the individual fibres both in cross section and in length. In a small-scale pot trial ramie plants were grown in soil alone, soil + dry leaves of *Tephrosia candida*, soil + tephrosia + CaCO₃, and soil + tephrosia + CaCO₃ + K₂SO₄. The green manure increased the diameter of the fibres, but the addition of CaCO₃ reduced it slightly below the control and the addition of K₂SO₄ caused a further reduction. CaCO₃, however, produced the longest fibres, this effect being slightly less marked when K₂SO₄ was included. *Other urticaceous fibres:* Lengths, percentage yields and tensile strengths of fibre and the chemical analyses of strips of rind are tabulated for 9 species, among which *Puzosia viminea* proved the most interesting.

1707. BARTOLOME, R.
Abaca production in Central America.
Philipp. J. Agric., 1950 (published 1951), **15**: 189-200, bibl. 2, illus.

Between 1942 and 1949 the United Fruit Company, acting under a contract with the U.S. Government, established the following areas under abaca in Central America: Costa Rica 10,400 acres, Panama 6,200 acres, Guatemala 5,400 acres and Honduras 5,000 acres. This paper gives an account of methods of cultivation,

diseases and pests, and methods of harvesting and decortication used in Costa Rica and Panama, and includes a note on yields and production costs.

1708. JULIANO, J. P.

A study of the mosaic disease of abacá, or manila hemp plant (*Musa textilis* Née), with special reference to sources of inoculum and possible transmission of the virus by mechanical means.

Philipp. Agric., 1951, 34: 125-32, bibl. 13.

Aphid transmission experiments, using *Aphis gossypii* Glover and *Aphis maidis* Fitch, revealed no new source of inoculum, and mechanical transmission experiments with mosaic viruses from abacá and 12 other sources yielded negative results.

1709. CASTILLO, B. S., AND AGATI, J. A.

Using weedicides in eradicating mosaic-infected abaca plants.

Philipp. J. Agric., 1950 [published 1951], 15: 175-87, bibl. 2, illus.

In an effort to find a more economical way of destroying mosaic-infected abaca plants than by digging them up, an experiment was carried out with 6 herbicides applied in 3 ways, namely, spraying, painting the corms cut near to ground level and soaking the corms. Two herbicides, sodium TCA and Ammate, were ineffective. The other four, all of which contained salts or esters of 2,4-D, killed the mother corms and followers within 1 to 2 months at the following concentrations: 2,4-Dow weedkiller at 0.94-1.88%, Estericide 330 and Weed B Gon 64 at 0.67-1.34%, and Shell weedkiller no. 40 at 1.34%. All three methods of application were effective.

1710. BOYCE, S. W., AND OTHERS.

Preliminary note on yellow-leaf disease of phormium.

N.Z. J. Sci. Tech. Ser. A, 1951, 33: 3: 76-7.

Oliarus atkinsoni is established as a vector of yellow-leaf disease of New Zealand flax.

1711. CLARA, F. M., AND CASTILLO, B. S.

Leaf spot of ramie, *Boehmeria nivea* (Linn.) Gaudich.

Philipp. J. Agric., 1950 (published 1951), 15: 9-21, bibl. 7, illus.

Mycological studies are reported on a leaf spot of ramie caused by a *Cercospora* sp., tentatively identified as *C. boehmeriana* Wor. In cases of severe attack 40% to 60% of the leaves become infected. Observations have shown that slow-growing plants are usually more subject to serious attacks than are fast-growing. In a small pot trial the application of sulphate of ammonia hastened growth and resulted in reduced infection as compared with unfertilized control plants.

1712. MEDINA, J. C.

L'expérimentation sisalière au Brésil. (Sisal experiments in Brazil.)

Coton Fibr. trop., 1951, 6: 45-54, bibl. illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 368.

The results of sisal manurial trials in Brazil are given and the nutritional requirements of sisal are reviewed. Deficiency symptoms are described.

1713. ILTIS, J.

Le crin végétal. ("Vegetable hair" [from *Chamaerops humilis*].)

Coton Fibr. trop., 1951, 6: 125-30, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 527.

The importance in Morocco and uses of "vegetable hair" or African fibre, produced by the palm *Chamaerops humilis*, are dealt with.

Hops.

(See also 1131, 2010.)

1714. KLAT, P.

Essais d'introduction de la culture du houblon au Liban, entre 1935 et 1950.

(Attempts to introduce the hop to the Lebanon between 1935 and 1950.)

Ann. Gembl., 1951, 57: 225-6.

In 1935, hop plants of the variety Groene Bel, obtained from the National Hop Institute of Belgium, were planted experimentally on the Bika plain in the Lebanon. They grew well initially but were killed by a spring frost. A second introduction the following year also resulted in failure. In 1947, a collection of hop varieties was obtained from Belgium and was distributed throughout the various agricultural regions of the Lebanon. Only those grown at the Agricultural Institute of Beirut succeeded. Samples of the Tettmang variety were sent back to Belgium for analysis and the results were comparable to those obtained from the variety grown in Belgium. Cultural trials are now planned, particularly on the possibility of growing hops in orange groves to afford them some protection from the sun.

Seed oils.

(See also 1722a.)

1715. ANON.

La culture du ricin. (Culture of castor beans.)

Marchés colon. Monde, 1951, 7: 1959, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 532.

Mention is made of a process developed in French Equatorial Africa for making a plastic similar to nylon out of castor oil. Two factories are already using the process. There are plans for the mechanical cultivation of castor beans in Africa.

1716. BAKER, E. D., AND VAN HORN, D. L.

An experimental castor bean harvester.

Bull. Okla agric. Exp. Stat. B-376, 1951, pp. 12, illus.

A tractor-mounted castor bean harvester, developed at the Oklahoma Agricultural Experiment Station and designed on the beater principle, is described and illustrated. Field tests were carried out in 1950 and machines for commercial use are now in production.

1717. PETRI, P. S.

Reazioni delle piante di *Ricinus communis* a incisioni sperimentali. (Reaction of *Ricinus communis* to artificial wounds.)

Nuov. G. bot. ital., 1950, 17: 564-82, bibl. 29.

The author has observed the regeneration and callusing which follow wounds made in the stems of the castor

oil plant. The speed of callusing is related to the water lost by the wounded cells. Callusing takes place whether the wound is left empty or has solid matter inserted into the cut, only the speed of callusing varies accordingly. Both the cortex and the vascular elements are regenerated. If the flow of assimilates is slowed down the whole stem is completely regenerated, a fact which suggests that regeneration depends on nutrition rather than on specific properties of the tissues.

1718. DUFRESSE, M., AND BRYSSINE, P.

Le carthame. (Safflower.)

Terre maroc., 1951, 25: 393-8, bibl. 13.

The literature on safflower, *Carthamus tinctorius*, is reviewed and an account given of work carried out on the crop during the past 10 years by the Centre de Recherches Agronomiques at Rabat. *The uses of safflower*: The percentages of oil found in the seeds and in the whole achenes are tabulated for Morocco and elsewhere and the characteristics of the oil and its uses are indicated. The plant also yields a dye—now supplanted by a synthetic dye—, a condiment from the dried flowers, of which the yield in Morocco is 40-50 kg. per ha., and a useful cattle cake from the decorticated seeds. *Selection of varieties*: Progress has been made in Morocco on the selection of varieties that are spineless and have other desirable characters. *Diseases and pests*: Several diseases and pests, including birds, are mentioned as occurring in Morocco, but none is serious. *Cultivation*: Information is given on soils, rotations, manuring and date of sowing. The method of sowing is discussed in some detail, and a spacing experiment is described in which no significant differences in yield occurred within the range of 60×20 cm. to 1 m.×40 cm. Cultural treatments, harvesting and threshing are also described. Yields usually vary from 10 to 15 quintals [1 q.=50 kg.] per ha., but may sometimes reach 25 quintals.

Sundry crops.

1719. DUNSTAN, W. J., AND SIMES, J. J.

Occurrence of saponins in spear-lilies.

Aust. J. Sci., 1950, 13: 50-1, bibl. 2.

Two members of the Amaryllidaceae, sub-fam. 2. *Agavoideae* viz. *Doryanthes excelsa* and *D. palmeri*, which grow along the eastern coastline of Australia, were found to give exceptionally good positive tests for saponin in both roots and leaf bases by two workers at Sydney Technical College.

1720. MULLINS, D.

Teasel growing—an ancient practice.

World Crops, 1951, 3: 146-7, bibl. 1, illus.

The cultivated teasel, *Dipsacus fullonum*, is still grown on a small scale in Somerset, and the methods of cultivation and harvesting and its use in woollen mills are here briefly described.

1721. PAPADAKIS, J.

Posibilidades agrícolas de la remolacha azucarera, amapola y guayule en la República Argentina. (Agricultural possibilities for the cultivation of sugar beet, opium poppy and guayule in the Argentine Republic.)

[*Publ.*] *Minist. Agric. Nac. B. Aires*, 1951, pp. 29, bibl. in text, map.

Poppy. During the year 1947-48 the Ministry of Agriculture in Buenos Aires took steps to encourage the production of opium poppy with the result that 500-1,000 ha. were grown in various parts of the country. A preliminary report, based on the year's experiences, is here given on the ecological requirements of the crop, the areas most suitable for production, the best methods of cultivation and the problems that need immediate solution. It is concluded that the crop requires a mild, moist climate during the stage of vegetative development and hot, dry weather during maturation to obtain a maximum morphine content. The Tres Arroyos area, south of Buenos Aires, is recommended for unirrigated production, while the western departments of Mendoza, La Rioja, Catamarca and Santiago del Estero are considered most suitable for irrigated production. For high yields, rich soils and heavy applications of nitrogen are required. The early development of the plant is slow and the land should therefore be clean. Weeding in the rows and thinning require hand labour, but sowing and cultivation may be mechanized. It is possible that a mechanical method of harvesting may also be developed. The selection of high yielding strains and investigations on the effect of variety, time of sowing, moisture and nitrogen on yield and morphine content are needed. *Guayule* has so far only been grown experimentally in the north and west of Argentina, where the winters are too warm to permit the accumulation of rubber in the roots. It is suggested that the Pampas district, south-west of Buenos Aires, is ideal for guayule production, there being sufficient cold for the accumulation of rubber but not sufficient to injure the plants, sufficient rainfall to allow for transplanting without irrigation, facilities for mechanization, and the fertile soils are not required for citrus production. A map showing the relative suitability of various parts of the country for guayule production is presented.

Noted.

1722.

a ANON.

La production des graines oléagineuses au Mozambique. (Production of oil seeds in Mozambique.)

Marchés colon. Monde, 1951, 7: 1824, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 531.

b BAETENS, P.

Beschouwingen over curare-alkaloiden, in het hijzonder over de d-tubocurarine. (On the curare alkaloids, with special reference to d-tubocurarine.)

Pharm. T., Belgium, 1951, 28: 1-2, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 376-7.

From the genera *Strychnos*, *Chondodendron* and *Erythrina*.

c FAURE, A.

La ramie peut-elle être exploitée en France ? (Can ramie be grown in France ?)

Rev. int. Prod. colon., 1951, 26: 259: 87-8, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 463.

- d SALEIX, C.
Les épices secondaires. (Spices of minor importance.)
Marchés colon. Monde, 1951, 7: 1818-19, 1874-5, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 531.
Nutmeg, cloves, pimento and cinnamon are dealt with.

- e MAYMONE, B., AND BATTAGLINI, A.
Ricerche sulla digeribilità e sul valore nutritivo delle carrube (*Ceratonia siliqua* L.). (Investigations on digestibility and nutritive value of carob bean pods.) [English summary $\frac{1}{2}$ p.]
Ann. Sper. agrar., 1951, 5: 721-44, bibl. 6.

FLORICULTURE.

General.

(See also 1132, 1178, 1183, 1446.)

1723. CALVINO, E. M.
Relazione tecnica della Stazione Sperimentale di Floricoltura Orazio Raimondo per l'anno 1950. (Annual Report of the Floricultural Research Station at San Remo for 1950.) [English summary $\frac{1}{2}$ p.]
Ann. Sper. agrar., 1951, Vol. 5, No. 5, Suppl. pp. lxiii-xcii.

A short account of the main activities of the station. The work includes breeding carnations, roses and freesias, gladioli, importation with a view to acclimatization and the improvement of cut flower production. Selection of free flowering clones of *Strelitzia reginae*, of highly scented and compact *Primula malacoides* plants, introduction and acclimatization of *Persea* (avocado) varieties. The avocado is thought to have a promising future in Italy.

1724. WASSCHER, J.
Weinig geteelde gewassen en nieuwe mogelijkheden in de bloementeelt. (Little-grown crops and new possibilities in floriculture.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1951, 14: 485-500, bibl. 29, illus.

An extension of floriculture in Holland is recommended and mention is made of a number of species and varieties which might be cultivated with advantage. Special attention is drawn to bulbous and tuberous plants, some for cut flower production, and to berry-bearing shrubs. Striking new varieties are described such as winter-flowering snapdragons, double stocks, and large-flowered varieties. Heterosis and tetraploidy are discussed in relation to new forms. Hastening or retarding the time of flowering by artificial illumination is also mentioned.

1725. SAMEN MAUSER, ZÜRICH.
De la germination. (Germination.)
Rev. hort. suisse, 1951, 24: 115-18, illus.
Trials made by the Zürich seed firm Mauser with over 100 varieties of flowers have shown that in most cases old seed germinates more readily than fresh. The percentage and rate of germination obtained with seed of various ages are recorded for 7 varieties.

1726. SMITH, K. M.
Some garden plants susceptible to infection with the cucumber mosaic virus.
J. roy. hort. Soc., 1952, 77: 19-21, illus.
The more common symptom of cucumber mosaic is mottling, but distortions of various kinds also occur.

Susceptible ornamentals include dahlia, lupin, lily, begonia, buddleia and *Daphne mezereum*. Two other viruses, one affecting chrysanthemum, the other, less important, observed on phlox, are also mentioned.

1727. KELSHEIMER, E. G.
Control of mole-crickets.
Circ. Fla. agric. Exp. Stat. S-15, 1950, pp. 7, illus.

Damage to seedbeds by mole-crickets in affected areas of Florida annually amounts to thousands of dollars. Statice seedbeds are mentioned as being seriously infested. There are 4 species of mole-cricket in Florida, of which two, Puerto Rican (*Scapteris vicinus*) and southern (*S. aetetus*), are economically important. Two to five lb. of technical chlordane, as emulsion or wettable powder, per acre usually give sufficient control in the seedbeds, which should be treated at least two days before seeding, for the treatment causes a temporary stimulation of cricket activity and the seedbeds may be torn up as a result of the insects burrowing.

Annuals and herbaceous plants.

(See also 1764c.)

1728. MARAMOROSCH, K.
Multiplication of aster-yellows virus in its vector.
Nature, 1952, 169: 194-5, bibl. 15.

Experiments at the Rockefeller Institute for Medical Research, N.Y., provided new and direct evidence for multiplication of aster-yellows virus in its vector, *Macrostelus divisus*, and confirmed earlier findings [see also *H.A.*, 21: 2841].

1729. THOMAS, W. D., JR., BAKER, R. R., AND ZORIL, J. G.
The use of ultraviolet light as a means of diagnosing carnation mosaic.
Science, 1951, 113: 576-7, bibl. 6.

Trials show that the fluorescence in ultraviolet light offers a convenient means for diagnosing mosaic virus in carnations. The modified technique used at Fort Collins, Colo., and here described gives results which differ little from those got by inoculating *Dianthus barbatus*.

1730. VON ARX, J. A.
Meeldauw op cineraria en andere sierplanten. (Powdery mildew of cineraria and other ornamental plants.) [English summary 11 lines.]
Tijdschr. PlZiekt., 1952, 58: 10-13, bibl. 6, illus.

Cineraria (*Senecio cruentus*), grown under glass, is often severely attacked by a powdery mildew which may cause serious losses. The strain of the mildew on cineraria does not attack other hothouse plants, and has, therefore, been named *Oidium cinerariae*, although the perithecial form is identical with *Sphaerotheca fusca*.

1731. SAVARY, A.

Les anguillules des chrysanthèmes. (*Chrysanthemum eelworms*.)

Rev. hort. suisse, 1951, 24: 72-6, 109-15, bibl. 6, illus.

Present knowledge on the biology and control of the chrysanthemum eelworm (*Aphelenchoides ritzema-bosi*) is reviewed, and an account is given of a series of large-scale experiments carried out at Lausanne during 1948-50 on control with sodium selenate. The results were highly successful and led to the following recommendations. Stock plants should be watered with a solution of sodium selenate, at the rate of 3 g. in 10 l. water per m², some time between the end of December and mid-February, i.e. 2-3 weeks after planting. Plants should be washed with clean water after treatment. Rooted cuttings should be treated in the same way 15 days after planting. For pot plants 20 c.c. solution is required per 8 cm. pot. Plants may also be treated in June with a concentration of 3 g. per 5 l. water, but care must be taken not to splash the leaves and the plants must be washed immediately afterwards.

1732. VON ARX, J. A.

De voetziekte van *Gerbera*, veroorzaakt door *Fusarium oxysporum* Schlecht. (*Fusarium footrot of gerbera*.) [English summary 1 1/2 p.]

Tijdschr. PlZiekt., 1952, 58: 5-9, bibl. 7, illus.

A footrot of *Gerbera jamesonii* (grown under glass in the Netherlands for its flowers) is shown, by isolation and inoculation experiments, to be caused by *Fusarium oxysporum*. The short stems blacken and rot, and the leaves and flowers die. The disease can be controlled by soil sterilization and by surrounding the base of the stems with a well-aerated, porous and fast-drying substance such as gravel or vermiculite.—Willie Commelin Scholten, Baarn.

1733. GAGANOV, P. G.

New varieties of perennial phlox. [Russian.]

Sad i Ogorod, 1951, No. 11, pp. 77-80, illus.

Since 1933 the author has been hybridizing perennial phlox in the neighbourhood of Moscow to obtain varieties suitable for cultivation in Russia. Some 40 varieties of different colours and times of flowering have been raised. The chief characters of 29 of these are given.

Ferns.

1734. PRITCHARD, A. E.

The fern mite.

Calif. Agric., 1951, 5: 7: 10, illus.

The fern mite, *Hemitarsonemus tepidariorum*, was recorded in England in 1904, but has only recently been identified in California. Several acaricides controlled the active stages of the mite, but only toxaphene spray

at a rate of 1 1/2 lb. actual toxaphene in 100 gal. water eliminated an infestation.

Bulbs, tubers, etc.

(See also 1142, 1173, 1994.)

1735. CARLSSON, G.

Drivningsförsök med blomsterlök i jord med höga saltkoncentrationer. (The forcing of flower bulbs in soil of high salt concentration.) [English summary 10 lines.] Medd. Gullkärs Växtförädl. Anst., Hammenhög, 1951, No. 7-8, pp. 191-8, illus.

Severe damage to hyacinths and tulips occurred when the bulbs were forced in soil of a high salt concentration. The resulting high conductivity was found to be particularly harmful, but high potash content in the absence of high conductivity proved equally injurious. Hence bulbs should not be forced in heavily fertilized soils and especially not following crops which need heavy potash applications, such as tomatoes.

1736. VIENNOT-BOURGIN, G.

Oidium begoniae Puttemans. Maladie nouvelle pour la France. (*Oidium begoniae*, a new disease in France.) Ann. Épiphyt., 1951, 2 (n.s.): 381-7, bibl. 14, illus.

A powdery mildew, *Oidium begoniae*, was found in December, 1950, on plants of *Begonia rex* growing under glass at Montluçon (Allier). The geographical distribution, symptoms, and the damage caused by the disease, the morphology and host relationship of the fungus, and the varietal susceptibility of begonias are described. A satisfactory method of control was found to be the application of 0.2% copper oxychloride when the disease appears.

1737. DE HAAN, I., AND DOORENBOS, J.

The cytology of the genus *Cyclamen*.

Meded. LandbHooesch. Wageningen, 1951, 51: 151-66, bibl. 16, illus.

All species and a number of garden varieties of the genus *Cyclamen* were examined cytologically, to establish the possibilities of hybridizing. The chromosome numbers found in the various species are in ascending progression: 20, 22, 30, 34, 48, 68, 96.

1738. BOSCH, E.

Die Cyclamenwelke. (*Cyclamen wilt*.)

Schweiz. Gärtnerztg, 1951, Vol. 54, No. 26, p. 1, illus.

A brief description is given of the symptoms of this new disease in Switzerland, caused by *Fusarium oxysporum* var. *aurantiacum*. For control the destruction of infected cyclamens and sterilization of soil and pots is recommended.

1739. ROISTACHER, C. N.

Hot-water treatment of gladiolus cormels.

From abstr. in *Phytopathology*, 1951, 41: 943.

Preliminary tests to determine the thermal death point of *Fusarium oxysporum* var. *gladioli* in gladiolus cormels indicate that it is close to the temperature that critically reduces germination of the cormels. Hot-water treatment for 30 min. at 135° F. reduced germination in semi-dormant cormels by 40% and at 137° F.

by 75%. Most non-dormant cormels failed to survive treatment at 133° F. or 135° F.

1740. MACLEAN, N. A.

Gladiolus smut.

From abstr. in *Phytopathology*, 1951, 41: 941.

Gladiolus smut (*Urocystis gladioli*) recently observed on cultivated gladiolus seedlings in California causes a blistering, shredding, and necrosis of stem and leaf tissues, and the death of severely infected seedlings.

1741. BALD, J. G.

Some experiments on curing and dipping gladiolus corms.

From abstr. in *Phytopathology*, 1951, 41: 935.

The best results for practical control of corm-borne diseases were obtained by curing corms at 35° C. immediately after digging, and the use of a fungicidal dip before planting, in this case lysol plus ferbam.

1742. ANON.

New Croft lily bulb grader developed.

Seed World, 1951, 69: 9: 33.

A machine has been developed at the Oregon State College that will grade Croft lily bulbs at an average rate of 30 bulbs a minute, six times as fast as the old hand-grading method.

1743. SERVAZZI, O.

***Botrytis elliptica* (Berk.) Cooke parassita dei gigli in Italia. (*Botrytis elliptica parassitica* on lilies in Italy.)**

Ann. Sper. agrar., 1951, 5: 1139-54, bibl. 28.

The incidence of botrytis disease of *Lilium candidum* near Turin was brought to the notice of the author in 1939. Though it has not reappeared, these notes from his own observations and those of foreign workers should allow of its quick discovery and treatment, should it do so.

1744. CROSSLEY, J. H., AND WOODS, J. J.

Narcissus culture in British Columbia.

[Mimeo.] *Saanichton Domin. exp. Stat.*, revised 1951, pp. 24, bibl. 31.

This mainly concerns bulb and flower production in the field and under glass in Vancouver Island and in the Fraser Valley of the mainland. The area under narcissi is on the increase, reaching 105 and 122 acres in those two districts in 1947. Instructions are given here on cultivation, harvesting, cleaning, grading and storing bulbs and on cultivation for cut flowers and methods of dealing with the flowers.

1745. VAN GEEL, J. D. W.

Het forceren van bolgewassen met behulp van kunstlicht. (The forcing of bulbous crops with artificial light.) [English summary ¼ p.]

Meded. Dir. Tuinb., 1951, 14: 501-12, bibl. 5, illus.

Forcing tulips with artificial light can be carried out in sheds intended for other purposes at other seasons once lighting has been installed. Incandescent lamps of 40 W. are recommended, distributed in such a way that every square metre radiates a total capacity of 100 W. and that the light is regular. From November to the middle of January, 8 lighting-hours give good results; the temperature must be maintained at about 14° C.

From tests with *Iris hollandica* var. Wedgewood it is considered that 40 W. lamps with a capacity of 150 W. per square metre for 12 hours a day will suffice.

Orchids.

(See also 1419, 1764b, d.)

1746. HSIANG, T.-H. T.

Physiological and biochemical changes accompanying pollination in orchid flowers. II. Respiration, catalase activity, and chemical constituents.

Plant Physiol., 1951, 26: 708-21, bibl. 36.

Part I of this series [see *H.A.*, 22: 805] deals with the effects of pollination and auxin treatment on the water balance of orchid flowers. Part II deals with their effects on respiration, catalase activity and chemical constituents. From the data presented in both papers it is concluded that the chain of reactions occurring in the column of the pollinated flower probably follows the order: increase in catalase activity; stimulation of respiration; acceleration of water uptake; increase of uptake of inorganic salts and mobilization of sugars; increase of hydrophilic colloids; increase in osmotic pressure. Naphthaleneacetic and indoleacetic acids at 0.5% in lanolin applied to the stigma qualitatively duplicated the pollen effects, NAA being more effective than IAA. Quantitatively, the auxin effect invariably ended with a levelling off, while the pollen effect showed a progressive increase. This was taken to substantiate the idea of earlier investigators that pollen does not supply the entire source of auxin necessary for continued fruit and embryo development and that more auxin is formed or released as the process advances.—Univ. Wisconsin, Madison.

1747. FEDER, W. A.

Yellow bud blight, a foliar nematode disease of Vanda Miss Joaquim orchids.

From abstr. in *Phytopathology*, 1951, 41: 938-9.

Flowering spikes of Vanda Miss Joaquim plants grown for the export flower market are attacked by a foliar nematode, probably *Aphelenchoides ritzema-bosi* or a closely related form. Affected flower buds turn yellow, then brown; they shrivel and fail to open. Up to 50% of the flowering spikes in some fields have been affected. The nematode is apparently distributed by the splashing of wind-borne rain drops. Excellent control was obtained by spraying at weekly intervals with parathion at the rate of 2-4 lb. of 25% wettable powder per 100 gal. water plus B-1956. A high degree of control was also obtained by the use of selenium as sodium selenate.

1748. FEDER, W. A.

Control of the fungal complex causing transit rot of Vanda orchid blossoms.

From abstr. in *Phytopathology*, 1951, 41: 938.

Species of *Botrytis*, *Gloeosporium*, and *Alternaria* form an infective complex which often causes total destruction of Vanda orchid blossoms shipped from Hawaii to the Continental United States. Affected blossoms become disfigured with brown specks or spots during shipment, and are usually broken down into a brown, rotted, watery mass upon arrival. Severe economic

losses have been sustained during peak flower seasons. Excellent control was obtained by atomizing the flowers immediately before shipping, with a 1:2,000 aqueous solution of 2-hydroxy-diphenyl formulated as Natriphene, or Dowicide A.

1749. PRITCHARD, A. E.

Control of orchid mites.

Calif. Agric., 1951, 5: 9: 11, illus.

The false spider mites occurring on orchids, *Tenuipalpus pacificus*, *Brevipalpus oncidii* and *B. australis*, can be best controlled with a 25% emulsion of DMC (di(parachlorophenyl)methyl carbinol) diluted at the rate of 1 pint per 100 gal. The two-spotted spider mite, *Tetranychus bimaculatus*, can be controlled with parathion or TEPP, but the new material 88-R or Aramite, which is less toxic to humans and has given good control on other tender plants, is worthy of trial at the rate of 1 lb. 15% wettable powder per 100 gal.

1750. DE FIGUEIREDO, E. R., Jr., AND LEPAGE, H. S.

O ácaro vermelho das orquídeas. (Red spider mite of orchids.)

Biológico, 1951, 17: 139-41, illus.

During the dry season in Brazil red spider mite (*Tenuipalpus* sp.) can be a serious pest of orchids, especially of *Laelia* and *Cattleya* species and hybrids. In hot regions such as Santos they may breed continuously throughout the year, producing as many as 24 generations. Notes are given on the life cycle and control of the pest. Sulphur, 3% wettable or colloidal, was found to give satisfactory control of the nymphs and adults but a double concentration was required to kill the eggs. Rhodiatox (diethyl paranitrophenyl thiophosphate) at a concentration of 1:1,000 gave good control of all phases.

1751. DE FIGUEIREDO, E. R., Jr., AND LEPAGE, H. S.

A larva "mineira" das raízes de orquídeas. (An orchid root miner.)

Biológico, 1951, 17: 196-9, bibl. 1, illus.

In several orchid collections in Brazil it was noticed that the leaves and pseudo-bulbs of many plants were withering. The trouble was traced to infestation by a root miner which was identified as a new species of *Agromyza* and called *A. orchidearum* Costa Lima. An account is given of the life cycle of the pest and the appearance of the insect in its various phases is described. The only cure appears to be fumigation with methyl bromide at a concentration of 25 g. per m³ for 1 hour in a partial pressure chamber, or 30 g. per m³ for 4 hours in a chamber with normal atmospheric pressure. Preventive spraying with 5% DDT, especially on the roots, is recommended. The adult flies can be controlled by periodic spraying with diethyl-paranitrophenyl thiophosphate (0.01% active principle) at the rate of 200 c.c. per 100 l. water.

Succulents.

1752. BERTRAND, A.

Le bouturage naturel des feuilles chez certains Crassulacées et Ficoïdées. (Natural propagation from leaf cuttings of certain Crassulaceae and Ficoïdaceae.)

Rev. hort. Paris, 1951, 123: 577, illus.

Certain succulents, including *Carpobrotus edulis* L., *Sedum stahlii* Solms, *S. rubrotinctum* Clausen and *Echeveria derenbergii* J. A. Purpus, were grown out of doors near Paris. The mature plants succumbed to the winter frosts but detached leaves which had fallen on the ground survived and rooted naturally in the spring.

Shrubs and trees.

(See also 1984.)

1753. SPITTA, M.

A quarter of a century of highway planting.

J. roy. hort. Soc., 1952, 77: 4-12, illus.

The organization and work of the Roads Beautifying Association in Great Britain is described.

1754. JACOBI, E. F.

De verbetering van het sierheestersortiment. (The improvement of available varieties of ornamental shrubs.) [English summary 1/2 p.]

Meded. Dir. Tuinb., 1951, 14: 480-4.

The work involved in improving kinds of ornamental shrubs is under the Boskoop Association. Its aims are to identify varieties in a collection, to select the best and most valuable types, and to ensure that these types are grown and sold by nurserymen under their correct names.

1755. WALKER, J.

Planting trees and hardwood cuttings on the Canadian Prairies.

Publ. exp. Fms Serv., Dep. Agric., Canada 864, 1951, pp. 13, illus.

Although this publication is intended primarily as a guide to prairie farm planting, the instructions should be useful to all planters of trees and shrubs. It deals with planting procedures, tree-planting machines, care of unplanted trees, transplanting established trees and taking, storing and planting hardwood cuttings. The general instructions apply to broadleaf trees, but the treatment of evergreens is also dealt with.

1756. McVAUGH, R.

A revision of the North American black cherries (*Prunus serotina* Ehrh., and relatives).

Brittonia, 1951, 7: 279-315, bibl. in text.

An extensive taxonomical study of *Prunus serotina* subspecies *serotina*, *hirsuta*, *eximia*, *virens* and *capuli*.

1757. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The bag-shelter moth (*Ochrogaster con-traria*).

Agric. Gaz. N.S.W., 1951, 62: 597-9, illus.

The weeping myalls or boree trees (*Acacia pendula*), grown in western and south-western districts of New South Wales as ornamental or shade trees, are sometimes completely defoliated by the caterpillars of the bag-shelter moth. The insect, its life cycle and its habits are described. The caterpillars are attacked by a number of natural enemies and the eggs are preyed upon by the caterpillars of a small moth. Considerable defoliation can be prevented if the bag-shelters are cut

off and destroyed while they are about the size of hens' eggs. The caterpillars may be killed by spraying the foliage either with arsenate of lead or DDT.

1758. VAN DEN BRANDE, F.
Les Ericas. (*Erica* species.)
Courr. hort., 1951, 13: 557-8, illus.

An account of the ornamental ericas, their multiplication by seed and by cuttings, with a key for the identification of the species.

1759. NAKASONE, H. Y., AND HAMILTON, R. A.
Four new hibiscus varieties.
Circ. Hawaii agric. Exp. Stat. 35, 1952, pp. 7, bibl. 3, illus.

Scions of these selections from the John A. Johnson collection at the University of Hawaii Experimental Station described here will become widely available in the near future.

1760. HOARE, A. H.
English lavender.
Agriculture, Lond., 1951, 58: 434-6, bibl. 2.

A note on the introduction into England from France by the Huguenots of *Lavandula vera*, now renamed *L. officinalis*, and a comparison of its products in England with those from more sunny climates of the same species, of *L. spica* and of their hybrid, lavandin.

1761. KERR, T. W., Jr.
The chemotherapeutic value of several insecticides for larvae of certain leaf mining insects.
J. econ. Ent., 1951, 44: 493-8, bibl. 9, being *Contr. R.I. agric. Exp. Stat.* 771.

Aldrin and dieldrin were the most effective chemotherapeutants tested against boxwood-, holly- and birch-leaf miners.

Turf.

1762. MUSSER, H. B., AND OTHERS.
Urea-formaldehyde and other nitrogenous fertilizers for use on turf.
Bull. Pa agric. Exp. Stat. 542, 1951, pp. 14, bibl. 17.

Urea-formaldehyde formulations showed more uniform rates of N release throughout the growing season than any other material tested in a 3-year trial in Pennsylvania. Single applications of urea-formaldehyde, activated sewage sludge and nitrogenous tankage were adequate to maintain a good quality turf throughout the season, whereas soluble nitrogen fertilizers proved more effective when used in split applications.

1763. GRAU, F. V.
Presenting: Merion (B-27) bluegrass.
Seed World, 1951, 69: 12: 8, 32-3, 38-9, illus.

Merion developed in the eastern U.S.A. is an improved bluegrass for turf with a low growth habit, is highly resistant to leafspot and weed invasion and is tolerant of heat and drought.

Noted.

- 1764.
- a BAILEY, L. L.
Effects of rooting media upon the asexual propagation of ornamental plants.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 60-2.
 - b LALLEMENT, E.-A.
Orchidées exotiques sur la Côte-d'Azur. (Exotic orchids of the Côte d'Azur.)
Rev. hort. Paris, 1951, 123: 590-1, illus.
Notes on the cultivation of some terrestrial and epiphytic species.
 - c LEGGE, B. J.
A Phytophthora crown rot of campanula.
Trans. Brit. mycol. Soc., 1951, 34: 293-303, bibl. 14, illus.
Caused by *Phytophthora porri*.
 - d MARTINSSON, G.
La multiplication des orchidées tropicales. (Propagation of tropical orchids.)
Rev. hort. suisse, 1951, 24: 295-300, illus.
Methods of propagation from seed are described.
 - e STATENS FORSGSVIRKSOMHED I PLANTEKULTUR.
Orienterende forsøg med nelliker i stenkultur. Afprøvning af forskellige voksemedier. (The gravel culture of carnations. A preliminary trial.)
Tidsskr. Planteavl, 1951, 54: 353-6, being *Medd. Stat. Forsøgsvirks. Plantev. 455*.
 - f WRIGHT, C. M.
Gomphrena globosa, a local-lesion indicator plant for the carnation mosaic virus.
From abstr. in *Phytopathology*, 1951, 41: 945.
 - g ZIMMERMAN, P. W.
2,4-D injury on roses.
Reprinted from *Amer. Rose Annual*, 1949, 34: 71-2, illus. [received 1952].

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

1765. MCFARLANE, N. L., AND WINRIGHT, G. L.
Desert agriculture.
Circ. Calif. agric. Ext. Serv. 176, 1951, pp. 56, illus.

The so-called Desert Area lies between California and Arizona and is remarkable for blistering heat, low relative humidity and little or no rainfall. The crops

which can be successfully cultivated under these conditions are discussed. They include a fair number of vegetables and the following fruit species: dates, figs, grapefruit, grapevines, lemons, oranges, varieties of peaches which do not demand winter chilling, pecans, Japanese persimmons, American and Japanese plums, pomegranates, quinces, strawberries, tangerines. A few hints are given on aids to their cultivation.

1766. (REBOUR, —., AND CUÉNOT, —.)
Travaux de recherches et d'expérimentation
du Service de l'Arboriculture d'Algérie.
(Research and experimental work of the
Service de l'Arboriculture in Algeria.)
Fruits d'Outre Mer, 1951, 6: 384-6.

A concise list of experiments in progress, notably on citrus and figs.

1767. GUTIEV, G. T.
Subtropical culture in the zone of the great
Turkmen canal. [Russian.]
Sad i Ogorod, 1951, No. 11, pp. 37-8.

This region with its good soil, warm climate, a long frostless period and mild winter, is suitable for the cultivation of olive, pomegranate, fig, almond, and, in winter, vegetables. Mention is also made of orange varieties and of lemon.

1768. FRINGS, L. X.
La reconstitution et l'entretien des sols
dégradés en arboriculture irriguée par
l'humiculture (humification permanente du
sol). (The rehabilitation and maintenance
of degraded soils in irrigated orchards by
means of permanent cover crops.)
Fruits et Prim., 1950, 20: 233-40, 348-53,
400-3, illus.

The case for maintaining a permanent cover of vegetation in orchards is discussed in detail with particular reference to conditions in North Africa. The treatise is divided into five chapters. The first, devoted to arboriculture and "humiculture" in a semi-arid region, deals with the factors affecting the performance of a fruit tree and enumerates the advantages and types of permanent cover crops. The second discusses the factors which under clean cultivation are liable to be unfavourable to the trees. The third deals with the conditions necessary for maintaining a permanent cover in conjunction with irrigation, and the fourth with methods of irrigation. Finally the use of manures is discussed.

Avocados.

1769. SCHWOB, R.
Composition chimique de l'avocat, *Persea
americana* ou *Persea gratissima*. (Chemical
composition of the avocado, *P. americana*
or *P. gratissima*.)
Fruits d'Outre Mer, 1951, 6: 177-83.

Detailed analyses extracted from the literature are tabulated and discussed for the principal varieties grown in Florida, California and Hawaii.

1770. ZENTMYER, G. A., AND KLOTZ, L. J.
Fungicides for the control of avocado fruit
rot.
From abstr. in *Phytopathology*, 1951, 41:
946.

Botryosphaeria ribis (*Dothiorella* sp.) causes a severe rot of avocado fruit in coastal southern California plantings. The fungus enters while the fruit is still on the tree but rot develops only when the fruit begins to soften, by which time it has reached the market or consumer. Spray trials over four years have shown that the disease can be controlled by two applications

of bordeaux, Crag Potato Fungicide 658, Bioquin 1, or Parzate.

Citrus.

(See also 1225, 1485a, 1846a-g, i, 2012.)

1771. F.A.O.
Citrus and dried fruit.
Commodity Rep. F.A.O. 19, 1950, pp. 107
[received 1952].

This bulletin should be in the hands of all those who may have it in their power to influence the planting activity of the producer of citrus and dried fruits. An overall view is given of present trends in production and markets in these two crops. Among points brought out are the following:

Production. Post-war average (1946-49) of citrus fruit is 28% above pre-war for oranges, which account for 75% of all citrus, 72% above for grapefruit and 13% for lemons. Only in the Mediterranean areas has it lagged behind pre-war production. The most striking increase is seen in French North Africa. In addition production in South Africa has been growing since the 1930s and Brazil has also increased her output. The United States is much the largest producer of dried fruits, accounting for 50% of the raisins and 75% of the prunes, but only 15% of the figs. Other major producers are the Mediterranean, the Near East and Australia. In each of the post-war years, however, total production of dried fruits has been lower than pre-war, despite a steady recovery—except for prunes—since 1946.

Considerable attention is paid in the bulletin to the marketing of both commodities. Consumer habits throughout the world would appear to be changing in favour of fresh fruit to the disadvantage of dried fruit, and while the outlook for the marketing of citrus fruit in the near future is favourable, despite a rapidly expanding production, that for dried vine fruits, i.e. raisins and currants, is more doubtful as the result of the expansion of production in the U.S.A., Turkey, Greece and Australia and a general decline in consumption in most countries. [Those wanting to follow trends for a further year can do so in a later publication of F.A.O. entitled *The State of food and agriculture. Review and outlook 1951*, F.A.O., Rome, 1951, pp. 60-3, \$1.00. This review deals with all agricultural commodities and with such tools of production as fertilizers and machinery.]

1772. FRIEND, W. H.
The fruit areas of America; Lower Rio
Grande.
Amer. Fruit Gr., 1952, 72: 2: 24-5, 54-5, illus.

Citrus fruits are the main produce of the Lower Rio Grande Valley, Texas, with 14 million trees planted in orchard form by 1949, and Redblush (Ruby) grapefruit is the "speciality" of the area. While conditions for citrus growing are on the whole very favourable, a serious frost danger exists and in the winter of 1950-51 millions of trees were killed or damaged by frost.

1773. TKATCHENKO, B.
Les agrumes en U.R.S.S. (Citrus in the
U.S.S.R.)
Fruits d'Outre Mer, 1951, 6: 43-54, 89-98,
bibl. 46, illus.

This review of the literature is restricted to the more original features of Russian citriculture, which has been built entirely artificially in areas that sometimes experience temperatures as low as -30°C ., until their production is now nearly equal to that of French North Africa. Following an account of the development of the industry and information on its distribution the relative frost resistance of the different species and hybrids of citrus is indicated and notes are supplied on some of the main varieties selected for cultivation. Cultural techniques described include cultivation in the open, the training of trees close to the soil, the planting of trees in trenches, the transfer of dwarf or semi-dwarf trees each winter to sheds, the growing of trees, particularly the lemon Pavlovo, inside dwelling houses and public buildings and the cultivation of citrus in special unheated glasshouses known as "limonaria".

1774. SPINELLI, P.

Il bergamotto di Reggio Calabria (*Citrus bergamia* Risso). (The bergamot of Reggio Calabria.)

Riv. Agric. sub trop., 1951, 45: 85-9, 134-50, 274-90, bibl. 45.

The author gives an interesting account of the cultivation and extraction of the bergamot citrus, the source of one of the finest basic essences of the perfumery trade. The value of the essential oil of bergamot produced on 6,200 acres in Reggio Calabria, the extreme toe of Italy, to which its cultivation is at present restricted, amounted to approx. £1,000,000 in 1948/49. Bergamot is usually propagated by budding on sour orange and planted some 176 trees to the acre with a protection of citrus or other trees as windbreaks. It begins to bear in the 3rd year from budding but is not seriously exploited for a few years. It flowers from mid-April to the beginning of May. Its inedible fruit is delicate, so that it cannot readily be transported. The fruits are harvested from early November when turning from green to yellow, the average weight of a fruit being 111 grams. Harvesting and processing, which are described, remain primitive but are remunerative. The average yearly production of essential oil is estimated as 59 kg. per hectare [or 52 lb. per acre]. Climatic features which are against successful cultivation are excessive heat, frosts, hail, snow and salt winds. Among pests and diseases found dangerous are numerous scale insects, gummosis (parasitic and of physiological origin) and mal secco due to *Deuterophoma tracheiphila*. Notes are included on other methods of processing, on the Research Station for Essential Oils at Reggio Calabria and on the Bergamot Association of Reggio Calabria.

1775. BROZZETTI, P.

Ricerche su la composizione chimica, la digeribilità e il valore nutritivo del pastaccio di bergamotto. (Investigations on the composition, digestibility and nutritive value of bergamot cake.)

Ann. Fac. agrar. Perugia, 1949, 6: 5-25 [received 1952].

The residues of bergamot extraction have for long been used as a cattle food in Calabria where alone the bergamot is grown commercially. The results of digestibility tests are here set out, from which it appears

that the nutritive value of the wet residues is 13.76 starch units, and of the dried residue 70.43 starch units per 100 kg.

1776. DUTTA, S., AND BHATTACHARYA, S. C.

A new citrus species of Assam, *Citrus assamensis* Dutta and Bhattacharya, sp. nov. Indian J. Hort., 1951, 8: 3: 1-5, bibl. 14, illus.

The new species, a tree 15 to 25 ft. tall, which is described in detail, is known in Assam as *Ada jamir* or in the Khasi hills as *Soh sying*. The *Ada* and *syng* both mean "ginger", because the aroma of the rind is held to resemble that of ginger. The fruit is valued locally for its aromatic flavour and very acid juice. *C. assamensis* resembles *C. hystrix* in certain respects, but there are important taxonomic differences.

1777. RUSSO, F., AND TORRISI, M.

Il poliploidismo nei *Citrus* autopoliploidi ed allopoliploidi. (Polyploidy in citrus. Auto- and allopolyploids.) [English summary $\frac{1}{2}$ p.]

Ann. Sper. agrar., 1951, 5: 1041-62, bibl. 38.

A consideration of the relevant literature is followed by observations on the behaviour of some 2,000 young citrus plants derived from crosses at Acireale. Some forms of allotetraploids not hitherto described show some paternal morphological characters, thereby differing from the autotetraploids which show only maternal characters. It is thought that the autotetraploids might be very useful in breeding triploids with a chromosome content showing their derivation from 3 different species. Such triploids might well combine absence of seeds, good yields, environmental hardness, and disease-resistance.

1778. CHOPINET, R., AND DUPOUY, J.

Résistance au froid de certains citrus et de leurs hybrides. (The resistance to cold of certain citrus species and their hybrids.)

Fruits d'Outre Mer, 1951, 6: 131-40, bibl. 23, illus.

The literature is reviewed and supplemented by observations made in France. In considering the possibility of growing various types in different parts of France the country is divided into 6 zones and the species and hybrids, mostly between *Citrus* and *Poncirus* or *Fortunella*, that might reasonably be expected to survive in each, as ornamentals if not for fruit production, are indicated.

1779. PY, C.

La polyembryonie chez les citrus. (Polyembryony in citrus.)

Fruits d'Outre Mer, 1951, 6: 321-6, bibl. 10, illus.

Studies made by the author in Morocco are summarized. An examination of 8,000 seeds has shown the following variations in polyembryony: Mandarins, *C. reticulata*, were very variable, the Clementine being usually monoembryonic, while the common type, Daï-Daï, showed an average of 10.46 ± 0.31 embryos per seed and the closely related Willow-Leaf up to 26 embryos. Sweet orange, *C. sinensis*, varieties examined were all polyembryonic with an average of about 4.5 embryos per seed. Sour oranges, *C. aurantium*, had a slightly lower average number. Shaddocks, *C. grandis*,

appeared to be strictly monoembryonic, but hybrids of this species, the grapefruits and pomelos, were slightly polyembryonic with an average of 2.5 embryos. The true lemons, *C. limon*, were weakly polyembryonic, but their hybrids were distinctly more so. The citron, *C. medica*, showed a range from 1 to 3.91 ± 0.17 embryos. The trifoliolate orange, *Poncirus trifoliata*, contained an average of 2.46 ± 0.17 embryos per seed. A more detailed study of the seeds from a single tree of the mandarin Willow-Leaf showed that the degree of polyembryony varied markedly in different parts of the tree, and it is suggested that there may also be variation in trees from different localities and in different seasons. With sour oranges the selection of the most vigorous plantlet has always led to a uniform stand of plants, and in less simple cases the use of a distinctive male parent such as the trifoliolate orange has proved a useful way of distinguishing the sexual plantlets. The rejuvenation of clones by grafting eyes taken from nucellar plantlets on to rootstocks is also discussed.

1780. OPITZ, K. W.

Troyer citrange rootstock propagation.

Calif. Citogr., 1951, 36: 454, 456.

Troyer citrange cuttings strike root under a wide variety of conditions; the best results have come from careful selection of cutting material, maintenance of high humidity, light and temperature control in the propagating frame, and the use of root-stimulating hormones. Clean, coarse builder's sand or a mixture of sand and peat are satisfactory for rooting.

1781. BITTERS, W. P.

Lemon fruit quality.

Calif. Agric., 1951, 5: 10: 10.*

Comparisons were made between the juices of Eureka lemons from 23-year-old trees growing on 6 rootstocks. Fruit from trees on rough lemon stock was consistently lower in juice content, soluble solids and titratable acidity than fruit grown on any other stock; it was also coarser in appearance and in a single sampling lower in ascorbic acid. Among the other stocks Sampson tangelo gave a slightly higher, and Cleopatra mandarin a slightly lower juice content and soluble solids than the others. There was little difference between trees on sweet orange, sour orange or grapefruit.

1782. KEBBY, R. G.

Development of young citrus groves. Sound management in early years is vital to success.

Agric. Gaz. N.S.W., 1951, 62: 590-3, illus.

Upwards of 30% of the trees in young citrus plantings in New South Wales are being lost each year through disease and faulty management. Precautions that should be taken to avoid such losses are outlined. A reasonable fertilizer programme for young growing trees is given.

1783. MARTIN, J. P., AND BATCHELOR, L. D.

The difficulties of replanting lands to the same species of orchard trees.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 1-10, illus.

* Very similar to article in *Calif. Citogr.*, 36: 439, 460; *H.A.*, 22: 868.

The failure of successive citrus orchards in California is believed to be due to the development of a detrimental microbial soil population and the apparent accumulation of a toxic organic substance in citrus soils, which specifically affect citrus. It appears, however, that the problem can be overcome by fumigation, at relatively high dosages, before replanting, and by using especially vigorous rootstocks which have been budded to particularly vigorous or nucellar strains of such common citrus varieties as Valencia oranges or Lisbon and Eureka lemons.

1784. MONSELISE, S. P.

Growth analysis of citrus seedlings. I.

Growth of sweet lime seedlings in dependence upon illumination.

Palest. J. Bot. (R), 1951, 8: 54-75, bibl. 23.

During the period May to October, 1947, samples of 10 plants of sweet lime seedlings, some grown in full sunlight and others under artificial shade, at first providing 26% to 30% of full light, later reduced to 13% of outside intensity, were uprooted each fortnight and measurements made of total dry weight, dry weight of roots, shoots and leaves, mean leaf area, number of leaves, height of seedlings and top: root and leaf area: leaf weight ratios. On the whole the shaded seedlings grew better and became larger than the seedlings in full sunlight, and had higher top: root and leaf area: leaf weight ratios. There were, however, few differences between the two groups of seedlings as regards the relative growth rate (R) or the net CO_2 assimilation rate based on leaf area (Ea) or on leaf weight (Ew). The general averages during the first summer of the seedlings' life were: $\text{Ea} = 3.561 \text{ g./sq. m. leaf area, day}$; $\text{Ew} = 5.038 \text{ g./100 g. leaf weight, day}$; and $\text{R} = 1.789 \text{ g./100 g. seedling weight, day}$. These values are lower than those reported elsewhere for annual plants, but compare well with data from the U.S.A. on a young apple tree. Following these studies a comparison was made between the photosynthetic activity of sweet lime and trifoliolate orange leaves. The most striking difference lay in the ratio of the leaf weight to total dry weight, which was over 31% in the sweet lime and under 20% in the trifoliolate orange. The evidence is considered sufficient to show that there is greater photosynthetic activity in the leaf of the deciduous trifoliolate orange than in that of the evergreen sweet lime.

1785. MONSELISE, S. P.

Some differences between sun and shade leaves of citrus trees.

Palest. J. Bot. (R), 1951, 8: 99-101, bibl. 4.

Studies on the morphological and physiological differences between sun and shade leaves are summarized, the varieties used being Shamouti orange, Marsh Seedless grapefruit and Clementine mandarin. Shaded leaves were generally flatter, contained fewer stomata on the lower side, had a larger leaf area and were very significantly thinner than leaves exposed to full sunlight. There was a gradient of increasing dry weight per unit area with an increase of sunlight striking the leaves, this being much more pronounced in the grapefruit and mandarin than in the orange. The osmotic value of the sun leaves of Shamouti orange at 8 a.m. was 15% higher than for shade leaves.

1786. MENDEL, K.

Orange leaf transpiration under orchard conditions. Part III.* Prolonged soil drought and the influence of stocks.

Palest. J. Bot. (R), 1951, 8: 45-53, bibl. 11.

Transpiration studies were carried out in October, 1948, on 13-year-old Shamouti [Jaffa] orange and Marsh Seedless grapefruit worked on 3 rootstocks. In each case one lot of trees had been left unirrigated throughout the summer and were in a severely wilted condition, while with the oranges another lot had been irrigated a week before the studies were made. In all the wilted trees daily graphs of transpiration and of the extent of stomatal aperture showed a peak in the early morning and a continuous decline throughout the day, though the level of both was very low at all times. The transpiration of the orange trees irrigated a week earlier was quite normal; one peak was reached at 9 a.m. followed by a depression at 11 a.m. and a further higher peak at noon; the extent of stomatal aperture was much greater than in the wilted trees and the graph of stomatal movements showed a marked parallelism to that of relative humidity. There were marked differences between the wilted trees on the 3 different rootstocks. The trees on rough lemon appeared to be the most drought resistant and the studies showed that they had higher transpiration rates, larger stomatal apertures and lower water saturation deficits in the leaves than trees on sour orange or sweet lime. Trees on sweet lime showed higher transpiration rates than those on sour orange although stomatal apertures were similar for both. In the irrigated orange trees stomatal apertures were similar for the 3 stocks, and transpiration rates were similar for rough lemon and sweet lime, but much lower for sour orange.

1787. CARRANTE, V., DI PRIMA, S., AND BOTTARI, V.

Terzo contributo alle esperienze permanenti di concimazione degli agrumi. (Triennio 1947-49.) (A third report on the permanent citrus manurial trials 1947-1949.)

Ann. Sper. agrar., 1951, 5: 679-720.

Further conclusions drawn from these experiments which are still in progress in pots and in the open ground at the Acireale Experiment Station and at Lentini in the east of Sicily include the following:

- (a) The more mixed the manuring of citrus, viz. organic and mineral, the more effective is it likely to be. (b) The simplest successful formulas are those based on: sulphate of ammonia and refuse, sulphate of ammonia, sulphate of potash and refuse, spent lime and refuse, potassium fertilizers, diammonium phosphate and nitrate of lime, and nitrate of lime alone, provided it is not used every year. (c) The most common form of organic manure is city refuse but it alone cannot supply all that is wanted. (d) Nitrogen is essential and is best applied in 3 doses, namely in spring, summer and autumn, half as nitrate and half in ammoniacal form, or for compact, heavy soils as cyanamide. (e) Potassium, even in the volcanic soils of Sicily, repays application and is given in one large amount at first, viz. 800 kg. of K_2O per ha. and then merely enough to replace losses. (f) Phosphorus alone does not have

much effect, though in conjunction with nitrogen it gives good returns. (g) A schedule based on 100 g. P, 100 g. K and 100 g. N plus 30 kg. of refuse per mature plant per year appears to be ideal and should not be exceeded. This applies to oranges, lemons and mandarins alike. (h) The coefficient of correlation between trunk girth and average fruit production over a three-year period is +0.57. (i) Vitamin C content is highest in oranges, 80-90 m.mg., as compared with 65-70 m.mg. in lemons and mandarins, the chief deciding factor being not the manuring but ripeness and position of the fruit on the tree. (j) A comparison of the amount of the NPK elements added and losses thereof during the biological cycle shows how remarkably small is the amount of these elements utilized in comparison with the amount supplied.

1788. SERVICE DE L'HORTICULTURE, RABAT.

Compte-rendu des résultats de trois années d'essais de fumure au pal sur Washington Navel. (Progress report on three years' results from a lance injection manurial trial on Washington Navel oranges.)

Terre maroc., 1951, 25: 336-44, bibl. 4.

In an experiment started in 1947 at the Station Régionale Horticole d'Ain Taoujdat in Morocco, 3 combinations of NPK, 6:3:4, 6:1:6 and 11:6:7:7, were applied by lance injectors to the soil round bearing Washington Navel trees. The fertilizers used were nitrate of soda, ammonium phosphate and sulphate of potash applied in 3 doses each year, totalling per tree 5.6 kg., 5.1 kg. and 4.2 kg. for the 3 treatments respectively. In the first 2 treatments the same dose was used throughout, in the third the spring dose had a different formula to the two later doses. Yields, which have been generally low, and numbers and weights of fruits are tabulated for three crops. The second formula, 6:1:6, has given consistently higher yields than the other formulae which have resulted in no significant improvement in yield over unmanured controls, except by comparison with the last pre-treatment yields in 1946-47. The second formula has also increased the average weight of the fruits, but not their number, as compared with the controls. It is considered to be too early, however, to draw any general conclusions from this trial.

1789. CHAPMAN, H. D., AND FULLMER, F.

Leaf analysis of citrus.

Calif. Agric., 1951, 5: 9: 6.

Samples of spring cycle leaves on fruit-bearing twigs were taken when 3 to 7 months old from 661 orchards, mostly orange. Less than 0.25% K in the dry matter represented deficiency, 0.25-0.4% slight deficiency, 0.4-0.6% a doubtful content so far as response to K is concerned, 0.6-1.3% an adequate content for yield but possibly not for fruit size, 1.3-2.5% an ample content for all needs, and over 2.5% excess K leading to large, coarse fruits. Analyses for P were made in 519 of the same orchards. 0.07-0.1% P in the dry matter represented slight deficiency, 0.1-0.14% the optimum range, and above 0.14% possible excess leading to reductions in both yield and fruit size.

1790. HEYMANN-HERSCHBERG, L.

Magnesium deficiency of Shamouti orange trees and its treatment.

Palest. J. Bot. (R), 1951, 8: 76-83, bibl. 23.

* For parts I and II, see *H.A.*, 9: 971 and 16: 2175.

† For abstracts of parts 1 and 2, see *H.A.*, 18: 1326, 1327.

A chlorosis appearing on Shamouti orange trees on light soils in Israel has been diagnosed as magnesium deficiency by aid of external leaf symptoms and leaf composition. Soil applications of magnesium salts failed to correct the deficiency; nor had increased nitrogenous fertilization any effect upon it. Two or four sprays with an aqueous solution of $MgSO_4$ (2% or, preferably, 4%) cured the disease, and chlorotic leaves turned green again. About one-third of the affected leaves, however, did not recover after treatment. The beneficial effect of Mg-salts was enhanced by the addition of minor elements (Fe, Zn, Mn) to the spraying solution, while the same micronutrient elements, when applied alone, did not improve leaf colour. [Author's summary.]

1791. HAAS, A. R. C.
Phosphate deficiency symptoms in lemon leaves in controlled cultures.
Calif. Citrogr., 1951, 36: 441, 460, bibl. 10, illus.

By growing lemon trees in controlled sand cultures with a range of phosphate concentrations, it was found that a deficiency of phosphate was accompanied not only by tipburn or by a leafburn anywhere on the leaf blade but that, in addition, the lighter areas in the faded or bronze-coloured leaves contained resinous or gum-soaked circular spots often enclosing a brown centre. Lemon trees differ from orange trees in their phosphate requirements and suffer severely in artificial cultures maintained at phosphate concentrations considered adequate for certain annual crops.

1792. TRUMBLE, H. P. C.
Zinc oxide and citrus leaf drop.
J. Dep. Agric. S. Aust., 1951, 55: 214-16, illus.

Serious leaf drop in citrus sprayed with zinc oxide for mottle leaf control [see *H.A.*, 21: 1968] was investigated. The trials suggest that the trouble is associated only with zinc oxides manufactured by the French or indirect process.

1793. KROTH, E. M., ECCLES, J. R., AND CROCKETT, S. B.
Salt and boron survey of citrus groves in the Lower Rio Grande Valley of Texas 1950.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 94-9, bibl. 9.

Practically all shallow ground water in the Valley contains boron and chloride in such quantities as to make drainage ditch water unfit for irrigating citrus. By good drainage and good quality irrigation water combined with efficient management, such problems can be overcome. [From authors' conclusions.]

1794. REBOUR, H.
L'infertilité du clémentinier. (Infertility in the Clementine mandarin.)
Fruits et Prim., 1950, 20: 341-2.

Genetic, climatic and cultural factors which might be responsible for increasingly irregular or poor cropping in the Clementine mandarin are discussed. The problem is still unsolved, but the author puts forward certain hypotheses. It would appear that there are several clones of Clementine, some of which flower very

freely but may carry poor crops, while others flower less freely but fruit normally. It is suggested that the former may use excessive quantities of nitrogen in flowering and suffer from N-starvation when the fruit is setting.

1795. ZACHARIA, D. B.
Flowering and fruit setting of Shamouti orange trees.
Palest. J. Bot. (R), 1951, 8: 84-94, bibl. 10, illus.

In Shamouti [Jaffa] orange trees growing near Rehovot, flowers on the southern sides of trees and on southern slopes opened a few days earlier than those on northern sides or slopes. The seventh day after unfolding was found to be decisive in the life of a flower, marking a peak in both flower abscission and the formation of a brown corky ring between the ovary and style which precedes the abscission of the latter in the fruits that have set. Three types of inflorescence observed in the Shamouti are described and their classification, whether cymose or racemose, is discussed. Measurements are given of the number and size of certain parts of the flower. In studies on flowers setting fruit 50% were apical while 13.2, 21.0, 14.5 and 1.3% were second to fifth flowers respectively. No autonomous parthenocarpic fruit set was found. The germinative capacity of the pollen of the Shamouti was significantly lower than that of the pollens of sour orange or of the Baladi (local seedy) orange, which in turn was significantly lower than that of the Clementine mandarin. Partial self-incompatibility was found, Shamouti pollen tubes penetrating less deeply into the Shamouti style than those of the other three varieties. Ample pollination seems to enhance the chance of tubes penetrating to the ovary.

1796. STEWART, W. S., KLOTZ, L. J., AND HIELD, H. Z.
Effects of 2,4-D and related substances on fruit drop, yield, size, and quality of Washington Navel oranges.
Hilgardia, 1951, 21: 161-93, bibl. 23.
Growth regulators: effect of 2,4-D investigated in studies on Washington Navels.
Calif. Agric., 1951, 5: 8: 4.

Among conclusions drawn from 43 field experiments carried out between 1946 and 1950 on navel orange trees, using different amounts of 2,4-D applied at different times in different ways, are the following: The application of 8 p.p.m. 2,4-D solution at 500 gal. per acre by spray duster resulted in a satisfactory commercial control of mature fruit drop. Satisfactory applications were made from 15 October up till 15 April. Very low volume applications (less than 10 gal. per acre) of high (2,400 p.p.m.) concentrations were effective when applied as a fog or fine mist by helicopter or by a high-pressure spray gun with a very small disc orifice. Spray was better than dust. No increase in yield resulted from the decrease in June drop induced. June application of a spray containing 24 p.p.m. 2,4-D appreciably reduced water-spot susceptibility of the fruit. Application of 2,4-D to young fruits or before flowering at sufficiently high concentrations generally induced increased size of fruit at harvesting. [From authors' summary in *Hilgardia*.]

1797. ZANINI, E.

L'emploi des stimulants hormonaux pour réduire les phénomènes de coulure et de chute des agrumes. (The use of growth substances to reduce crop failure and fruit drop in citrus.)
Fruits et Prim., 1950, 20: 269-74, bibl. in text, illus.

Observations at the University of Palermo have shown that mandarins in full production produce 40,000 to 80,000 flowers but only mature 200-300 to 600-700 fruits. Preliminary trials in 1948 with Fruitone sprays at 0.5% and 0.1% on opening flower buds, flowers and young fruits had little practical effect in so far as there was increased fruit drop on the treated trees as the fruit approached maturity. There was also no evidence of induced parthenocarp. In 1949 trials were carried out with Planofix dilutions containing 10 and 5 p.p.m. naphthaleneacetic acid on 6-7-year-old mandarins carrying a heavy crop. With 10 p.p.m. applied on 22 November a gale on the 24th blew down only 5-8 fruits compared with 20-30 on control trees. By 22 January the controls had lost nearly all their fruit, but the treated trees still carried 65-70% of their fruit in good condition. By 18 February the treated trees still retained 55-60%. The treated fruits were difficult to pick, a piece of rind often coming away with the stalk. Similar results were obtained when the spray was applied on 29 December, when the fruit was already ripe, and when it was applied twice both in November and December. The trials with 5 p.p.m. showed similar but less pronounced effects. Simple tests with oranges gave confirmatory results.

1798. DUCHARME, E. P., KNORR, L. C., AND BANEI, A.

Danos causados a los citrus por el 2,4-D. (Damage caused to citrus by 2,4-D.)
Idia, 1951, 4: 44: 12-14, bibl. 3, illus.

Types of damage due to 2,4-D sprays observed on citrus in Argentina include a rolling of the tips of the leaves, a roughening of the fruit skin and a dry scaliness on the roots.

1799. BROOKS, F. A., AND OTHERS.

Heat transfer in citrus groves.
Calif. Agric., 1951, 5: 8: 5, 14-15, illus.

Information obtained from studies in California on radiation cooling, conduction from the ground, convection from overhead, and condensation and freezing is outlined. Field studies on the expense of frost protection showed orchard heaters to cost about \$3.60 per acre hour, wind machines \$0.55 and a combination of wind machines with a few heaters \$0.67. The use of wind machines over a wide area is unlikely to have the pronounced effect found when they are used in a limited area; over a wide area their main benefit would be a modification of the natural profile and more uniformity in orchard temperatures. Tests at Riverside show, among other things, that wind machines lower the temperature at the 40-ft. level whereas heaters raise it, and this makes it necessary to place machines every 600 to 800 ft. to offset the tendency with distance for air movement to revert to the original up-drift inversion. Information is also given on the estimation of heat flow inside a citrus orchard,

the arrangements for recording tests and types of wind machine.

1800. SAMYGIN, G. A., AND VINOKUR, R. L.
The significance of soil temperature in trench cultures of lemons. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 79: 887-9.

When lemons are grown in trenches in regions where open conditions are unfavourable for citrus culture the soil temperatures in the trenches (with depths of 1 to 2 m.) is lower in spring than that of the air and only warms slowly, so that root action and plant growth is delayed. In relation to this the authors describe experiments with seedling lemons and plants on trifoliolate rootstocks grown in vessels with the soil temperatures regulated by thermostats. The conclusion drawn from the data obtained is that an increase in soil temperature in trenches is favourably reflected not only in growth but also in dormancy by the retention of more leaves.

1801. COOPER, W. C.

Influence of rootstock on injury and recovery of young citrus trees exposed to the freezes of 1950-51 in the Rio Grande Valley.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 16-24, bibl. 8.

The Rangpur lime rootstock had a definite tendency to induce hardness in the leaves of Red Blush grapefruit trees. Cold injury to leaves and shoots of the grapefruit trees worked on rough lemon was similar to that observed on trees on sour orange, while those on Cleopatra mandarin were more severely damaged. Observations on Shary Red grapefruit grown in plots made saline indicated that high soil salinity greatly diminishes the degree of cold hardness of certain scion-rootstock combinations. The development of new tops on frozen grapefruit and Valencia oranges was also found to be affected by the rootstock. Trees on rough lemon made a better recovery than those on sour orange, the recovery of trees on Cleopatra mandarin varied and on King and Kara mandarins was notably poor.

1802. MAXWELL, N. P.

Pruning tests with citrus trees damaged by freezes in the Lower Rio Grande Valley.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 11-15.

The operations were designed to afford a comparison of both timeliness and methods of pruning. Results observed to date are recorded.

1803. BYNUM, W. M.

The effect of maleic hydrazide on the growth of citrus seedlings.
Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 58-9, bibl. 2.

Citrus suffer the worst effects from cold when in active growth. In trials at Vescalo in the Lower Rio Grande Valley, maleic hydrazide sprayed on young seedlings during the coldest part of the winter inhibited growth, i.e. induced temporary dormancy, the duration of which depended on the concentration used.

1804. JEPFSON, L. R.

Studies on the cause and development of ridges on lime fruit.*

Hilgardia, 1951, 21: 105-12, bibl. 3, illus.

Ridges and excrescences on the fruit have recently been responsible for the rejection of 5% to 10% of the lime crop in San Diego County, Calif. Trials prove that the citrus bud mite is not responsible. The cause remains uncertain, but observation shows that the ridges arise as the result of incomplete separation of the stamens and pistil or of the fusion of pistil and stamens during flower development. Moisture in the form of fog, dew or rain and the fungi, *Botrytis cinerea* and *Alternaria citri*, were found to be associated with the origin of the deformities.

1805. CASTELLANI, E.

Brevi notizie sulla "tristeza" degli agrumi.

(Short notes on tristeza disease of citrus [with particular reference to Brazil].)

Riv. Agric. trop., 1951, 45: 365-72, bibl. 23.

Tests at the Fazenda Santa Helena which is attached to the Agronomic Institute of Campinas lead the author to conclude that: Used as a rootstock *Sweet Orange* tolerates tristeza but except for certain strains it is very susceptible to *Phytophthora* spp. *Mandarin* is much the same and retards initial fruit bearing in scions. *Rangpur Lime* (hybrid of *C. reticulata* × *C. aurantifolia*) is much used in the Rio de Janeiro district owing to the fact that it tolerates tristeza. It is, however, very susceptible to cold and gummosis though it shows some resistance to the latter when worked with the Pera strain of *Sweet Orange*. It is rejected by citrus growers in Sao Paulo. The *Rough Lemon* of Florida and also that of Brazil, which is probably a hybrid, are resistant to tristeza but are generally susceptible to *Phytophthora* spp. and are otherwise not very desirable stocks. *Grapefruit* is susceptible to tristeza. In addition scions grafted on them do well at first but fall off later. *Trifoliolate Orange* is exceptionally resistant to tristeza and is not attacked by *Phytophthora* spp. It is fairly often used in Uruguay as a rootstock, but in Brazil its growth is poor, scions on it grow slowly and unite with difficulty and it is not popular. *Various hybrids*. Rootstock trials are in progress with tangelos (*C. reticulata* × *C. paradisi*), citranges (*Poncirus trifoliata* × *Citrus sinensis*) and citrumelos (*P. trifoliata* × *C. paradisi*). The citrumelo is promising as combining resistance to tristeza with vigour. Results of Valiela's trials in Argentina agree with those at Campinas. Present-day recommendations in Brazil are that new orange planting should be done on *Rangpur* lime in districts where cold is not a problem and where the Pera strain of orange is used, and elsewhere on their own roots, using sweet orange strains noted for their compatibility and for resistance to *Phytophthora* spp. The author concludes with a table grouping the different stocks according to the susceptibility of their different tissues to tristeza.

1806. SPERONI, H. A.

El afrancamiento de las plantas cítricas enfermas de "tristeza". (Inducing scion-rooting in citrus trees affected with tristeza.)

Idia, 1951, No. 45, pp. 18-20, illus.

In several citrus orchards in Argentina inarching with

* See also H.A., 22: 889.

resistant rootstocks has been tried as a method of saving tristeza-infected trees. In some cases it has been successful, especially where the disease was not too far advanced. Another method that has been tried with success is that of inducing scion rooting in infected trees. This is done by removing 3 small patches of bark at intervals round the circumference of the tree, 2 cm. above the union. The wounds are then covered with soil which is watered heavily and mulched with straw or leaves. Fifteen days later the trunk and surrounding soil should be sprayed with bordeaux mixture to prevent the development of gummosis. New roots should develop within 4 months. This method can only be used if the union is not more than 25 cm. above soil level. During the first year special attention must be paid to irrigation and poor soils must be well fertilized to encourage rooting.

1807. LAMOUR, R.

Viroses des agrumes en Afrique du Nord.

(Viruses of citrus in [French] North Africa.)

Fruits et Prim., 1950, 20: 381-4.

A survey of citrus groves in Algeria has shown that the virus strains causing psorosis are widespread and affect all species and varieties. The effects of psorosis and the various symptoms of the virus are described. In varieties that are supposed to be tolerant it is suggested that cases of premature senility may be associated with the presence of a virus or a combination of several strains. To deal with the problem it is concluded that a central breeding station should be established for the North African territories to provide rootstocks and certain varieties grown in isolation, to determine if the sour orange is the most suitable rootstock, and to select nucellar lines to rejuvenate the best standard varieties periodically. It is also pointed out that, although the symptoms of a virus called "infectious chlorosis" were described by Trabut in 1913 and that these symptoms closely resemble those of quick decline, this virus appears to have disappeared completely from Algerian groves.

1808. KNORR, L. C., DuCHARME, E. P., AND BANFI, A.

La exocortis en los montes cítricos de la Argentina. (Scaly butt in citrus groves in Argentina.)

Idia, 1951, No. 45, pp. 8-12, bibl. 8, illus.

The present state of knowledge on scaly butt disease of citrus is reviewed and observations on its occurrence, symptoms and economic effects in Argentina are recorded. The disease is limited to *Poncirus trifoliata* rootstocks and develops only when certain scion varieties are used. It seems probable that it is of virus origin. Natural spread in the orchard does not seem to occur, the disease being spread only by vegetative propagation. As symptoms appear before the trees are 10 years old, spread of the disease can be prevented by propagating only from healthy trees more than 10 years of age.

1809. WAIBEL, C.

The effect of psorosis on the survival of Red grapefruit trees after the 1950-51 freeze in the Lower Rio Grande Valley of Texas.

Proc. 6th Annu. Rio Grande Valley hort.

Inst., 1952, pp. 25-7, bibl. 2, illus.

Trees with leaf and bark symptoms of psorosis were more susceptible to freeze injury than psorosis-free trees.

1810. CALAVAN, E. C.

The incidence of lemon shell bark in budlings from closely related sources.

From abstr. in *Phytopathology*, 1951, 41: 936.

Eureka lemon trees from some closely related lines differ greatly in their susceptibility to shell bark. Important differences may develop within two bud generations. Extreme variation in shell-bark susceptibility is common among budlings from certain scion sources but rare among others. Shell-bark variants are often perpetuated by bud propagation.

1811. OLSON, E. O.

Investigations of citrus rootstock diseases in Texas.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 28-34, bibl. 12, illus.

During recent studies the following diseases were found to attack rootstocks: Rio Grande gummosis, cotton root rot caused by *Phymatotrichum omnivorum*, cachexia, Rangpur lime disease, and *Phytophthora palmivora*. This is the first report on the occurrence of the last three named diseases in Texas.

1812. ANON.

Melanose of citrus.

Agric. Gaz. N.S.W., 1951, 62: 467-9, illus.

During the past three seasons, with their long periods of rain and high humidity, there has been a great increase of melanose in coastal citrus orchards in New South Wales, and the losses due to fruit blemish have been high. The disease is caused by *Diaporthe citri* which grows in the dead wood. On the fruit the disease is limited to the rind surface where small black spots arise, often arranged in streaks or droplet formation. Dead or weak wood should be pruned out and burnt, and bordeaux mixture 3-3-80 plus $\frac{1}{2}$ gal. white oil applied as soon as the petals have fallen; where infection has been heavy another application 6 weeks later is advised.

1813. TANAKA, S., AND NAKAMURA, S.

Studies on the causal fungus of citrus melanose in Japan. [Japanese, English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1950, 19: 177-84.

The causal fungus responsible for citrus melanose in Japan in 1948 was found to be *Diaporthe citri* (Fawcett) Wolf (*Phomopsis citri* Faw.).

1814. FLETCHER, W. A.

Citrus pests and diseases in New Zealand. Recognition and control.

Bull. N.Z. Dep. Agric. 20, revised 1951, pp. 24, bibl. 17, illus.

This bulletin has been prepared to help growers to identify, by means of a diagnosis table, the various pests and diseases, fungous, bacterial and physiological, which may attack their trees and to recommend suitable measures for their control. It also includes suggestions on the treatment of tree wounds and on a general spray programme.

1815. SMIRNOFF, W. A.

Aperçu sur le développement de quelques cochenilles parasites des agrumes au Maroc. (A review of the development of certain citrus scales in Morocco.)

Trav. orig. Serv. Déf. Vég. Maroc, 1, pp. 29, illus.

An ecological study of the scale insects, *Lepidosaphes beckii*, *L. gloveri*, *Chrysomphalus dictyospermi* and *Parlatoria zizyphus*, on citrus in Morocco.

1816. SMIRNOFF, W.

La cochenille "pou rouge" dans les cultures d'agrumes au Maroc. (The red scale of citrus, *Chrysomphalus dictyospermi* Morgan, in Morocco.)

Terre maroc., 1951, 25: 402-6, illus.

This paper is primarily devoted to an account of the life history of the red scale in different parts of Morocco. Its parasites and predators are also mentioned, as is its control by spraying with 2% or 2½% oil emulsions.

1817. ROBERTS, R.

Practical points in the control of California red scale.

J. Dep. Agric. Vict., 1951, 49: 582-4, illus.

For the control of California red scale (*Aonidiella aurantii*) on citrus the best single treatment in any one season is summer fumigation and the next best, winter fumigation. Where two treatments are to be given, the oil/fumigation programme is recommended. Where reliance is placed on oil spraying alone the following schedules are recommended. For a heavy-scale infestation two sprays of white oil (1 gal. to 40 gal. water) should be applied between mid-December and mid-March, the interval between the two sprays in summer being not greater than 6 to 8 weeks and not less than one month. If it be considered necessary to apply an oil spray earlier than mid-December, or a second spray later than 1 April, white oil at a strength of 1 in 70 should be used; where an oil spray is applied at this strength prior to mid-December, it should be followed by a 1 in 40 strength in January, February or March.

1818. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The cottony cushion or fluted scale (*Icerya purchasi*).

Agric. Gaz. N.S.W., 1951, 62: 421-2, illus.

In New South Wales this scale infests various wattles (*Acacia* spp.), climbing fig (*Ficus* sp.), laburnum, mulberry, citrus and various other plants. The insect and its control are described. In New South Wales the scale is usually kept in check by predaceous ladybird beetles (*Rodolia cardinalis*) and their larvae. It is also parasitized by the larvae of a small black fly (*Cryptochaetum iceryae*). Where control measures become necessary, a white oil emulsion, diluted at the rate of 16 fl. oz. to 4 gal. water may be used.

1819. REYES O., H.

La cochinilla algodonosa (*Icerya purchasi*, Mask.). (Cottony cushion scale.)

Agric. trop. Bogotá, 1951, 7: 6: 43-5, bibl. 1, illus.

The cottony cushion scale, mainly a pest of citrus, also attacks ornamentals including roses, jasmine and

chrysanthemums, cherimoya, tamarind and certain legumes and palms. Methods of control recommended include biological control by *Rodolia rambouxi* and *Synaldis agropyri* and chemical control by chlordane, bromuloxion, emulsion 55, and moose sulphate.

1820. GIANNOTTI, O., AND PUTZ, D.

Pulverização de laranjeiras com inseticidas modernos e seus efeitos sobre a população de duas cochonilhas. The effect of modern insecticides on the population of two scale pests of orange trees.

Bol. Inst. 1951, 17: 171-7, bibl. 16.

Investigations were made in a commercial orange orchard in Brazil to determine the effect of DDT, BHC, toxaphene and thiophosphate sprays on the population of the scales *Chrysomphalus ficus* and *Lepidosaphes beckii*. DDT sprays increased the scale population to about 10 times that of the controls, by far the greatest effect being on *Chrysomphalus ficus*. The other materials had no significant effects. Preliminary counts showed that there were fewer micro-hymenopterous parasites of the scale on plots sprayed with DDT than on the control plots.

1821. DeBACH, P., DIETRICK, E. J., AND FLESCHER, C. A.

Ants and citrus pests.

Calif. Agric., 1951, 5: 7, 14, illus.

Studies made in groves that had received no insecticidal treatments for 4 to 24 years have shown that the presence of ants restricts biological control of such pests as scale insects, mites and aphids and causes reductions in leaves and crops and smaller fruit sizes.

1822. DEAN, H. A.

Natural enemies of scale insects in the Lower Rio Grande Valley of Texas.

Proc. 6th Annu. Rio Grande Valley Inst. Insect., 1952, pp. 38-41, bibl. 7.

Evidence is presented indicating that low temperatures reduced the populations of some scale insect parasites. In a Pink Marsh grapefruit orchard control of ants, which nurse the honeydew producing insects, was effectively carried out by 1 lb. chlordane in 100 gal. and showed promising results in increased numbers of chalcids and twice stabbed lady beetles.

1823. GRIFFITHS, J. T.

Possibilities for better citrus insect control through the study of the ecological effects of spray programs.*

J. econ. Ent., 1951, 44: 464-8, bibl. 12.

It is suggested that in the production of citrus fruit for canning the cost of spraying may be considerably reduced without affecting internal quality and yields. An intelligent interpretation of the interaction of pests, their predators and insecticides is essential. [See also the two preceding abstracts and 1846c.]

1824. ELMER, H. S., EWART, W. H., AND CARMAN, G. E.

Abnormal increase of *Coccus hesperidum* in citrus groves treated with parathion.

J. econ. Ent., 1951, 44: 593-7, bibl. 6, being Pap. Calif. Citrus Exp. Stat. 690.

In trials in California parathion has been used for the

* Paper presented as part of symposium on "Compatibility of insecticide programs with biological control" at Denver, Colo. Dec. 1950.

control of various scale insects and its effect on soft (brown) scale was studied. High dosages or multiple applications of parathion tended to result in higher populations of soft (brown) scale than low dosages or single applications. Entomophagous insects reduced infestations provided no more parathion applications were made. Petroleum oil sprays containing parathion generally resulted in lower populations of soft (brown) scale than did similar sprays without oil. In all plots treated with organic phosphates there was an increase in populations of soft (brown) scale. Aldrin and dieldrin also caused slight increases, while DDT, three analogues of DDT and rotenone caused no abnormal increases.

1825. EWART, W. H., ELMER, H. S., AND GUNTHER, F. A.

Parathion treatments for the control of citricola scale on citrus in California.

J. econ. Ent., 1951, 44: 598-603, bibl. 15, being Pap. Calif. Citrus Exp. Stat. 679.

Three methods of applying parathion were compared: (1) thorough-coverage sprays applied with conventional high pressure equipment at the rate of 25 to 35 gal. per tree, (2) low-volume sprays applied at the rate of 100 to 200 gal. per acre, and (3) dusts applied with a spray-duster at the rate of 100 lb. per acre. Citricola scale, *Coccus pseudomagnoliarum*, was commercially controlled by all 3 methods during late summer and autumn, the thorough-coverage spray being most effective, followed by the low-volume spray. The success of the low-volume spray is important, since it is the cheapest. When the 3 treatments were made in late winter and early spring the thorough-coverage alone gave satisfactory commercial control. Increases in soft (brown) scale populations were noted in some groves following parathion treatments.

1826. YUST, H. R.

Studies on improving the distribution of hydrocyanic acid in citrus fumigation.

[Publ.] U.S. Dep. Agric. E-822, 1951, pp. 8, bibl. 5.

Changes in place of release of the gas and certain changes in the vapourizer nozzle itself resulted in better distribution of HCN, but serious operational disadvantages of the revised set-up were discovered and there was no improvement in the kill of red scale.

1827. SHAW, J. G., AND ORTIZ, M.

Dips for the citrus blackfly as a possible treatment for Mexican limes boxed for export.

J. econ. Ent., 1951, 44: 660-5, bibl. 3, illus.

Commercially prepared spray oil emulsions and emulsive oils gave some control of citrus blackfly, *Aleurocanthus woglumi*, but caused significant fruit injury. They also caused off-flavour of the juice prepared from the treated limes. Emulsified Socony-Vacuum process oils known as "Prorex P" and "Prorex C" at 1% to 3% dilution gave good control without damaging the limes or affecting their flavour. Emulsions of allethrin and 20% pyrethrum extract showed promise.

1828. DI MARTINO, E.

Sulla "fetola" degli agrumi. (Fetola of citrus fruits.) [English summary 3/4 p.]

Ann. Sper. agrar., 1951, 5: 1423-32, bibl. 4.

Observations show that *Empoasca decedens*, the leafhopper which causes the disfiguring marks of fetola on citrus fruits, has many summer hosts as well as cotton. It can, moreover, be borne considerable distances by the wind. Hence direct control measures seem best. Of three insecticides tested in Sicily a 1% spray of Gesarol containing 10% DDT plus a wetter gave good results.

1829. SLEETH, B.

The citrus-root nematode in the Rio Grande Valley.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 35-7, bibl. 10.

Incidence of citrus-root nematode *Tylenchulus semi-penetrans* and control measures are discussed.

1830. BARTHOLOMEW, E. T., CARMAN G. E., AND STEWART, W.

Invisible injury of citrus [from Sprays]. *Calif. Agric.*, 1951, 5: 10: 5.

In 54 tests the juice of Valencia and Navel oranges from DDT-sprayed trees contained a slightly higher concentration of soluble solids and a tendency towards a higher percentage of total acid than the juice from oil-sprayed trees. Parathion showed a similar slight effect in the majority of 43 tests. No effect on soluble solids was found in one test where DDT was applied 8 times at 1-2-month intervals. Comparing oil sprays with and without HCN fumigation on grapefruit again showed the oil-sprayed fruit to contain lower total soluble solids. Further tests showed that oil-sprayed oranges contained less ascorbic acid than unsprayed fruits or fruits sprayed with dioctyl phthalate. Unsprayed mature orange leaves had a higher dry matter content than oil-sprayed leaves in a majority of cases.

1831. GONZALEZ-SICILIA, E.

Características de los frutos de algunas variedades de agrios. (The characters of the fruit of certain citrus varieties.) [English summary ½ p.]

Bol. Inst. Invest. Agron. Madrid, 1951, 11: 24: 135-209, bibl. 5.

The following characters of varieties of citrus growing in the Estación Naranjera de Levante (Valencia) have been studied: size, weight, volume, shape and density of the fruit; weight and percentage of the rind; quantity of juice and its density and soluble solids, acidity, sugars content, ascorbic acid content, and size and weight of seeds. The influence of the soil on the composition and quality of the fruit has been studied in the Spanish Levant. Oranges and clementines have equal amounts of saccharose and glucose but other tangerine varieties have a saccharose content double that of glucose. Lemons have a higher content of glucose than of saccharose. The data obtained are summarized in 15 graphs and 18 tables.

1832. KREZDORN, A. H., AND CAIN, R. F.

Internal quality of Texas grapefruit.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 48-52, bibl. 8.

Compared with data reported by Florida workers, Texas grapefruit is of exceptionally high quality as based on solids, acid and solids/acid ratio. This high standard is due to favourable environmental conditions,

including low rainfall, use of sour orange rootstocks, and the exclusion of oil sprays for scale control, which, if ill-timed, prevents the formation of normal solids.

1833. RAMÍREZ, C. A.

Composición del jugo de naranjas. (The composition of orange juice.)

Suelo Tico, 1951, 5: 73-4.

Data are tabulated and discussed on the composition of the juice of seedling sweet oranges from the Meseta Central district of Costa Rica, harvested during January-April, 1949 and 1950.

1834. SPOON, W.

Sappen van Surinaamse sinaasappelen en grapefruit. (Juices of oranges and grapefruit from Surinam.) [English summary 17 lines.]

Ber. Afd. trop. Prod. roy. trop. Inst. Amsterdam 232, 1951, pp. 9, bibl. 5.

Attempts are being made to utilize the surplus citrus produced in Surinam. Compared with juices from other parts of the world Surinam orange juice is less concentrated and the grapefruit juice about equal to that from elsewhere. The recommendation is made that since the mixed juices are very palatable they should be so manufactured.

1835. ALDERMAN, D. C.

Effect of harvesting and packing operations on external quality of Texas grapefruit.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 53-7, bibl. 4.

Careful handling of the fruit greatly reduced the amount of bruising and enhanced the quality rating. Of the two shipping containers used paperboard boxes caused less damage than did wire-bound bruce boxes.

1836. DES GARETS, O.

Le transport des agrumes en containers.

(The transport of citrus in bulk containers.)

Fruits d'Outre Mer, 1951, 6: 369-73, illus.

Large crates ranging from 4 cu.m. to 9 cu.m. and holding up to 3 tons in use for carrying merchandise from France to North Africa have been tested as bulk containers for transporting boxes of citrus in the reverse direction. The method has several distinct advantages: The fruit is well protected in transit, lighter cases can be used with less tight packing, and handling charges are reduced.

1837. FISHER, C. H., AND MATCHETT, J. R.

Processing and utilization research on citrus fruits.

Proc. 6th Annu. Rio Grande Valley hort. Inst., 1952, pp. 63-72.

Citrus juices, frozen concentrates, powders and the utilization of by-products as fodder, pectin, seed and peel oils and glycosides are considered.

1838. MONSELISE, S. P.

Weight losses of oranges during storage as influenced by a commercial plastic coating.

Palest. J. Bot. (R), 1951, 8: 95-8.

Dipping Shamouti oranges in 4 dilutions of Good-Rite VL600 Latex resulted in a small but significant reduction in the loss of weight during storage. Three treatments involving Polycy 117H had the opposite effect. A further trial with VL600 Latex on Valencia

oranges later in the spring, when temperatures were higher and humidities lower, again showed that the plastic covering reduced weight losses, but the gain was only about 2%, which is of doubtful commercial value. In addition the coatings had no beneficial effect in preserving frost-injured fruit or in reducing losses through fungi.

Dates.

(See also 1846j.)

1839. MUNIER, P.
Contribution à la mise en valeur du Sahara Soudanais français. (Contribution to the development of the French Sahara.)
Fruits d'Outre Mer, 1951, 6: 104-8, illus.
The distribution of date palm groves in the French Sahara is indicated and the main climatic features of the 4 zones that make up this territory are described. The culture of dates is in a primitive and neglected condition, and a research station has recently been established by the I.F.A.C. at Kiffa to rehabilitate the date groves.

1840. PEREAU-LEROY, R.
Expérimentation sur le palmier-dattier en Algérie. (Research on the date palm in Algeria.)
Fruits d'Outre Mer, 1951, 6: 238-40, illus.
Experimental work being undertaken at the main date research station at El Arfiene in southern Algeria is summarized. In a manurial trial all treatments containing P reduced yields significantly by comparison with unmanured controls; only NK+FYM gave significant increases in yield. Observations on irrigation cycles suggest that the 15-day cycle should be abandoned, even in winter, in favour of a 10-day cycle. Thinning fruiting bunches to 4 or 6 reduced yields without an appreciable improvement in quality; by contrast, cutting off the end one-third of each bunch did not reduce yields significantly but increased the proportion of first quality dates. An experiment has been laid down to determine if the vigour of parent trees of the variety Deglet Noor affects that of trees raised from their suckers or if clones of differing vigour exist within this variety. Crosses have been made with the object of establishing varieties that could be multiplied from seed. Selection of male trees is being made for high pollen production and early flowering. A simple apparatus has been designed which makes it possible to pollinate palms up to 8 m. high from the ground.

Tung.

1841. BRAY, G. T.
The cultivation and production of tung oil.
Parts I and II.
World Crops, 1951, 3: 247-50, 299-302, bibl. 9, illus.
The first part of this review includes general descriptions of *Aleurites fordii* and *A. montana* and gives details of acreages and production in China, the U.S.A., Nyasaland, South Africa, Australia, India, Indo-China, Java, Argentina, Brazil, Paraguay, the Belgian Congo, Madagascar, the French Cameroons and the U.S.S.R.

The second part gives details of climatic and soil requirements, based largely on experience with *A. fordii* in the U.S.A. and *A. montana* in Nyasaland, and outlines methods of propagation by seed and budding, planting out, manuring, cultivation, harvesting, yields and diseases. The preparation of tung oil, which takes place in three stages, namely drying the fruits, removing the hulls and nut shells, and expressing the oil, is also summarized.

1842. GILBERT, S. G., SHEAR, C. B., AND GROPP, C. M.
The effects of the form of nitrogen and the amount of base supply on the organic acids of tung leaves.
Plant Physiol., 1951, 26: 750-6, bibl. 14.

The effects of base supply (Ca, K, Mg) and nitrogen source (nitrate *versus* ammonium) on total organic acid and oxalic acid production were investigated with seedling tung trees grown in a nutritional experiment set up in factorial design. Oxalic acid formation was found to be directly related to nitrate concentration and nitrogen uptake from all nitrate solutions as well as to Ca supply and uptake. Both K and Mg influenced oxalic acid formation by their repressing effect on Ca uptake. It is suggested that oxalic acid formation in the tung plant is a by-product of the process of oxidation of carbohydrates which furnish energy for reduction of nitrate to protein N. With an all-nitrate supply, a high Ca requirement results from the precipitation of oxalate with the oxalic acid formed in this type of N metabolism. When nitrate reduction is lessened, a correspondingly lower Ca requirement exists for normal growth. [Authors' summary.]—Bur. Plant Indust., Soils, agric. Engng, Gainesville, Fla.

1843. HILDITCH, T. P., AND MENDELOWITZ, A.
The component fatty acids and glycerides of tung oil.
J. Sci. Food Agric., 1951, 2: 548-56, bibl. 17.
Oils of both *Aleurites fordii* and *A. montana* were studied at Liverpool University, and one oil from *A. montana* nuts contained as high (78%) a proportion of elaeostearic acid as that usually associated with *A. fordii* oils. The proportion of elaeostearic acid in the mixed acids of the oils examined varied between 72% and 82%, but it is considered that these differences are more likely to be due to environmental than to genetic influences.

1844. HILDITCH, T. P., AND OTHERS.
Variations in the composition of some linolenic-rich seed oils.
J. Sci. Food Agric., 1951, 2: 543-7, bibl. 14.
The oils examined at Liverpool University included those obtained from candlenuts (*Aleurites moluccana*) and from rubber seed.

Other crops.

(See also 1231.)

1845. ALBO, G.
La riproduzione e la ripartizione dei sessi nella *Ceratonia siliqua* L. (Reproduction and the distribution of the sexes in the carob.)
Nuov. G. bot. ital., 1951, 58: 60-72, bibl. 25, illus.

The author's observations here described on the large carob population in the south-east corner of Sicily lead him to a reclassification of *Ceratonia siliqua* L. as follows: α -hermaphrodita Albo (1951)= α -typica Albo (1949), (a) longistami Albo (1949), (b) brevistami Albo (1949), (c) sessilistami Albo (1949); β -polygama Albo (1951); γ silvestris (Fiori) 1924; and δ -edulis Albo (1919).

Noted.

1846.

- a ALDRICH, D. G., Jr., VANSELOW, A. P., AND BRADFORD, G. R.
Lithium toxicity in citrus.
Calif. Agric., 1951, 5: 10: 6.
For other accounts see *H.A.*, 21: 2918 and 3963a.

- b CASSIN, J.
Remarques sur les résultats d'analyses effectuées sur les agrumes au cours de la campagne 1949-50. (Remarks on the results of citrus fruit analyses in the 1949-50 season [in Algeria].)
Fruits et Prim., 1950, 20: 343-7.
With particular reference to acidity and dry matter.

- c DEBACH, P.
The necessity for an ecological approach to pest control on citrus in California.
J. econ. Ent., 1951, 44: 443-7, bibl. 12, being *Pap. Calif. Citrus Exp. Stat.* 667.

- d DEBACH, P., FLESCNER, C. A., AND DIETRICK, E. J.

A biological check method for evaluating the effectiveness of entomophagous insects [on citrus].

J. econ. Ent., 1951, 44: 763-6, bibl. 7, being *Pap. Calif. Citrus Exp. Stat.* 685.

- e EWART, W. H., AND ELMER, H. S.
Citricola scale control.
Calif. Agric., 1951, 5: 10: 7, 14.
Coccus pseudomagnoliarum with parathion [see also abstract 1824].

- f FLANDERS, S. E.
Citrus mealybug.
Calif. Agric., 1951, 5: 7: 11, illus.
Studies on 4 new parasites.

- g HARDING, R. B.
High-yield orange orchards.
Calif. Agric., 1951, 5: 9: 12, 14.
A study of management practices and soil conditions.

- h KONIS, E.
On the temperature of *Opuntia* joints.
Palest. J. Bot. (J), 1950, 5: 46-55, bibl. 6.

- i MOSSEL, D. A. A.
The fermentation-inhibiting properties of orange oil.
Nature, 1951, 168: 999, bibl. 4.
Dutch work.

- j PY, C.
Quelques documents concernant la récolte et le conditionnement des dattes aux Etats-Unis. (Some notes on the harvesting and processing of dates in the U.S.A.)
Fruits d'Outre Mer, 1951, 6: 194-6, illus.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 1396, 1985, 2000, 2013-2015, 2019-2023.)

1847. BLONDELEAU, L.
Organisation des recherches agronomiques en Afrique occidentale française. (The organization of agronomical research in French West Africa.)
Agron. trop., 1951, 6: 174-8.

An account is given of the organization of research on crops in French West Africa. The two main centres of research, each with a series of substations, are situated at Bambey and Bingerville. The second is mainly concerned with tree crops, notably coffee, cacao and cinchona.

1848. PELEGRIN, P. (I.F.A.C.).
L'Institut des fruits et agrumes coloniaux. (The Institute of colonial fruits and citrus.)
Marchés col. Monde, 1951, 7: 1207-9, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 377.

An account of the experimental work of the I.F.A.C. with bananas and pineapples in the Ivory Coast.

1849. KING, K.
Horticultural districts of Queensland. 7. Central Queensland.
Qd agric. J., 1951, 73: 73-83, illus.

The climate of Central Queensland is tropical with 40 to 67 in. of rain falling mostly in summer. The horticultural soils are brown-red loams, alluvial soils and sandy granitic loams, and the natural vegetation is an open eucalyptus hardwood forest. The growing of pineapples, bananas, papaws, citrus, grapes, custard apples, mangoes, tomatoes and vegetables is briefly described. The pineapple is considered the most stable crop and papaws are also assured of a ready market in the south. Tomatoes depend largely on favourable seasons. C.W.S.H.

1850. STEPHENS, S. E.
Horticultural districts of Queensland. 8. The dry tropical zone.
Qd agric. J., 1951, 73: 139-51, illus.

The horticultural areas round Bowen, Townsville and Charters Towers in North Queensland are described. Average annual rainfall is between 25 and 47 in., nearly all of it falling in summer. Natural vegetation is open forest and the horticultural soils are mostly alluvial; nitrogen is usually deficient and zinc and copper deficiencies are found in inland areas. Irrigation is necessary for 9 months of the year and the water is supplied by wells and streams. The production of bananas, pineapples, mangoes, papaws, citrus fruit, grapes, tomatoes, melons, and vegetables is discussed. Nutgrass is a troublesome weed in pineapples.

Common Rough is the chief variety, but the growing of Smooth Leaf is increasing. Kensington is the favourite mango. Many varieties of orange are grown at Charters Towers and Pentland and grapes are also cultivated there, Rough Ascot being most suitable. Of the vegetables, cucumbers, marrows and pumpkins are grown for export. C.W.S.H.

1851. DE GEUS, J. G.
Sumatra-gronden en hun cultuurwaarde.
(Soils of Sumatra and their agricultural value.)
Plant en Bodem, 1951, 7: 3-46, bibl. from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 552.

An account is given of the types of soil in Sumatra, their requirements and their value for coffee, rubber, cinchona, tea and pepper production.

1852. LADEWIG, J. E.
Soil conservation in Queensland. 8. Soil conservation in horticultural areas.
Qd agric. J., 1951, 73: 1-18, illus.

Erosion has been due largely to lack of contouring and the erroneous belief that dust mulch cultivation conserved moisture. A detailed account is given of methods of contouring with particular reference to bananas, pineapples and vegetables. Clear diagrams illustrate the points described. The lay-out of irrigation lines and the importance of crop residues, rotations, cover cropping and green manuring are also mentioned. C.W.S.H.

1853. GORRIE, R. M.
Instructions for soil conservation practice in smallholdings and highland allotments.
Ceylon Coconut Quart., 1950, 1: 4: 11-16, illus. [received 1952].

The concise instructions given in this paper with the aid of diagrams include recommended soil and water conservation measures for hillsides already planted with tree crops and for land that has not yet been planted.

1854. SUAREZ DE CASTRO, F.
Las barreras vivas en la conservación de los suelos. (Living barriers for soil conservation.)
Agric. trop. Bogotá, 1951, 7: 8: 45-8, bibl. 1, illus.

Directions are given for planting strips of densely growing perennial plants along the contour in (a) annual crops, (b) coffee plantations.

1855. TIDMAN, D. A.
Agricultural and horticultural problems of Brazil.
World Crops, 1951, 3: 341-4, 364, illus.

This account, devoted to some of the entomological and mycological problems facing agriculture in Brazil, includes notes on leaf cutting ants, *Atta* spp., and on the more important pests and diseases of cacao, coconuts, sugar, tobacco, bananas and mangoes. Control measures in use or under trial are indicated.

1856. STELLWEG, C. A., AND LOS, E. J. D.
Arbeidmeting in de landbouw. (Calculation of labour efficiency in agriculture.)
Bergcultures, 1951, 20: 355-63, bibl. 6.

The importance of calculating labour efficiency in tropical agriculture is discussed and the disadvantages of some of the criteria used are pointed out. The Bedeaux unit system, which is explained in detail, is considered the most practicable method.

1857. VINK, A. P. A.
Mechanisatie in de bergcultures. 3. (Mechanization of highland plantation crops. 3.)
Bergcultures, 1951, 20: 325-33, 343-51, bibl. 3, illus.

In the first two papers of this series [see *H.A.*, 22: 933] the theoretical possibilities of mechanization in Indonesian agriculture are considered. This third reports on some practical experiments carried out by the C.P.V. Research Station on mechanical land reclamation andalang grass control.

1858. ANON.
L'arrosage artificiel dans nos territoires d'outre-mer. (Sprinkler irrigation in the French colonies.)
Cahiers colon., 1951, 34: 79-81, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 329.

The sprinkler irrigation systems used for tree crops such as bananas, coffee, cacao and citrus are described.

1859. VAN DEN BOSCH, R., BESS, H. A., AND HARAMOTO, F. H.
Status of oriental fruit fly parasites in Hawaii.
J. econ. Ent., 1951, 44: 753-9, bibl. 8, being *Tech. Pap. Hawaii agric. Exp. Stat.* 231.

Infestation trends in guava fruits indicate that the parasites *Opius longicaudatus*, *Opius* sp., *O. incisus* and *O. oophilus*, colonized in 1947, had markedly reduced oriental fruit fly, *Dacus dorsalis*, populations by 1950.

1860. BALOCK, J. W., AND LINDGREN, D. L.
Toxicity of various compounds as fumigants to eggs and larvae of the oriental fruit fly.
J. econ. Ent., 1951, 44: 657-9.

Results obtained in laboratory trials in Hawaii with 53 compounds and mixtures are tabulated. A differential effect between eggs and larvae was apparent with several compounds. Nine were found, however, extremely toxic to both immature stages of the oriental fruit fly, *Dacus dorsalis*.

1861. BALOCK, J. W.
Ethylene dibromide for destroying fruit fly infestations in fruits and vegetables.
Science, 1951, 114: 122.

Ethylene dibromide was used successfully as a fumigant in large scale tests to destroy the immature stages of the oriental fruit fly in papaw and guava and the melon fly in cucumbers and tomatoes. Phytotoxicity tests showed no injury. A comparison shows that ethylene dibromide is 17 times as effective as methyl bromide in destroying immature stages of the oriental fruit fly in papaw. Preliminary data indicate that it is equally toxic to the Mediterranean fruit fly.

1862. SUDIRJO, G. P.

Die grosse Achatschnecke (*Achatina fulica* Fer.). (The giant African snail.)
Hemera Zoa, 1951, 58: 279-301, from
 abstr. in *DocumBl. trop. Prod. Amst.*, 1951,
 6: 525.

This study of the giant African snail, a serious tropical pest, deals with possibilities of control and its use as cattle fodder, manure and human food.

Bananas.

(See also 1709, 1981f, m, n, o, v, 1982c.)

1863. BAKER, R. E. D., AND SIMMONDS, N. W.
Bananas in East Africa. Pt. 1. The botanical and agricultural status of the crop.
Emp. J. exp. Agric., 1951, 19: 283-90, bibl. 9.

This paper arose out of a tour of East Africa designed to see if there were any banana varieties likely to be of value to the Banana Research Scheme in Trinidad. Information is given on localities, the history and botanical status of the crop, its agricultural status, the identity and pseudonyms of certain varieties, and pests and diseases. It would seem that bananas must have been introduced to Africa as suckers (not seeds) many hundreds of years ago. It is estimated that there are about 70 varieties present, but this probably includes an unknown number of somatic mutants. An annotated list of varieties will be given in Part 2.

1864. SABATIN, E. JU.

Bananas of the Soviet humid subtropics.
 [Russian.]
Priroda, 1951, 40: 7: 67-8.

An account is given of the bananas grown in the Soviet humid subtropics, with particular reference to ornamental species of *Musa*, though species with edible fruits are mentioned, as are also species of related genera, viz. *Ravenala madagascariensis* (the travellers' tree) and *Strelitzia reginae*. The ornamental species briefly described are *Musa boosjoo*, the Japanese banana introduced from China and now grown along the Black Sea coast of Caucasia, *M. ensata*, the Abyssinian banana, and two newly introduced species, *M. arnoldiana* and *M. religiosa*, indigenous in the Congo valley, which are propagated from seed and now grown in the Batum botanic garden. The possibility of using some of these species in breeding experiments is envisaged.

1865. NAIR, T. G., AND SUNDARARAJ, D. D.

Abnormalities in bananas.
Indian J. Hort., 1951, 8: 3: 24-7, bibl. 9, illus.

Abnormalities observed in bananas growing at the Banana Research Station, Aduthurai, are described. They include lateral fusion of 4 adjacent fruits in the variety *Poovan*, fusion between fruits in the upper and lower row of a hand in *Rasthali*, and complete fusion of all the fruits in a single hand in *Monthan*. It is suggested that these may be cases of discontinuous bud variations. Other abnormalities described are the premature emergence of bunches through the side of the pseudostem, the fusion of adjacent hands in *Poovan*, and modifications in the arrangement of petals in 3 varieties.

1866. JEATER, J. G.

Contour-planted bananas give excellent results.

Agric. Gaz. N.S.W., 1951, 62: 530.

Many banana growers on the north coast of New South Wales are replacing the orthodox square system of lay-out by planting in rows across the slope or along contours. This system produces more first-crop bunches, provides ample ground shade, and makes the single-sucker system of pruning easier to control.

1867. MERNY, G., GUYOT, H., AND DAUDIN, J.

La maladie de sigatoka (*Cercospora musae* Zimm.) aux Antilles françaises. (Leaf spot disease of bananas in the French West Indies.)
Fruits d'Outre Mer, 1951, 6: 229-34, bibl. 9.

The distribution and intensity of the disease in Martinique and Guadeloupe are discussed with the aid of maps and the seasonal variation in intensity in the former island is indicated. A spraying experiment with 8 fungicides, 6 of which were based on copper, showed Bordeaux mixture at 1:1-25:100 to be the most effective. A trial on the frequency of spraying showed that applications every 2 and 3 weeks were more effective than applications every 4 weeks. Further trials are in progress.

1868. ANON.

Cercospora leaf spot of bananas.

Agric. Gaz. N.S.W., 1951, 62: 605-6, illus.

The leaf spot disease of bananas (*Cercospora musae*) is briefly described and control measures given. From early December to March spray monthly all plants which will bunch during January to May with a suspension of copper oxychloride (1½ lb. to 40 gal.) and colloidal sulphur (1 lb. or 11-4 fl. oz. to 40 gal.). Bordeaux mixture (1-1-10) may be used instead of copper oxychloride. Promote vigorous growth by desuckering to the one-plant-one-sucker system, by fertilizing, weed control and winter cultivation.

1869. DAUDIN, J., AND LAURIOL, F.

Essais de traitement des régimes de bananes contre la pourriture de la hampe. (Experiments on the treatment of banana bunches against fruit stem rot.)

Fruits d'Outre Mer, 1951, 6: 184-8, bibl. 4, illus.

Aspergillus niger and *Botryodiplodia theobromae*, with two species of *Fusarium* causing secondary infection, have been found in bunches of bananas from Guadeloupe showing stem rot. In experiments in Guadeloupe and Paris using artificially or naturally infected stems or sections of stems a number of fungicides and materials designed to reduce moisture losses were tested. The results were largely negative. Of the materials used to reduce moisture losses grafting wax was particularly effective, but there was no evidence that this checked the spread of fungi. Some of the fungicides had a slight effect, under conditions where infection had already occurred, and might therefore be of use in preventive treatments.

1870. BRUN, J.

Pourriture de la hampe et "dégrain" des bananes. (Fruit stem rot and "dégrain" of bananas.)

Fruits d'Outre Mer, 1951, 6: 374-6.

Dégrain" and fruit stem rot are identical disorders and constitute the most serious trouble of bananas exported from the African coast. Its causes are mechanical injury in the transport of bunches, physiological upsets commonly at the end of the dry season, and attack, generally secondary in nature, by diseases such as *Gloeosporium musarum*. Mechanical injuries could be reduced by improved packing or the use of less susceptible varieties. Tests in the Ivory Coast have shown that packing in boxes gives good results, but the cost of using non-returnable containers is prohibitive. The substitution of varieties of *Musa* *insensis* such as the Poyo or Grande Naine for the Canary banana may offer a solution. Investigations are in progress on the physiological aspects of the trouble, but for the present it is only possible to recommend using K rather than N fertilizers and applying irrigation water as soon as the rainy season ends. Direct action against latent infections by organisms on the stems is unlikely to be of value, but trials suggest that treating the cut ends with vaseline containing 1% boric acid will reduce losses in transit [see also preceding abstract].

871. WILLIAMS, C. G.

The harvesting, handling, packing and marketing of bananas.

Qd agric. J., 1951, 72: 335-55, illus.

Methods of harvesting and packing bananas, so that the minimum of damage shall be done to them, are described. Banana bunches are harvested at the green mature stage, cut with 2 in. of stem below the bottom hand, and stacked vertically. The lay-out of a satisfactory packing shed is given. The standard banana boxes, made of hardwood or pine, measure 21 × 12 × 12 in. internally. Hands are cut from the bunches with a thin knife giving a semicircular cut. Such hands easily break into parts or single bananas and the pack usually consists either of singles or clusters of 2-6 bananas. Full hand packs are also described and illustrated. Bananas for New South Wales and W. Australia must be treated with salicylanilide to kill "squinter disease" fungus.

C.W.S.H.

872. BOULAIS, J.

La poudre de banane mûre. (Ripe banana powder.)

Fruits d'Outre Mer, 1951, 6: 109-13, illus.

Following brief descriptions of dehydration by atomization and on a rotating drum, the drying of bananas at different stages of maturity is discussed. Analyses showed that the starch content of very green bananas was about 25% of fresh weight and this had declined to 2% in fruits turning yellow-green. Total sugars in the same range rose from 0.8% to 19.0%, but declined slightly as the fruit became yellow and then yellow-brown. These figures and those for the analyses of powders made from turning and fully ripe fruits suggest that, so far as nutritive value is concerned, it might be better to use the former for drying, though on a commercial scale fully ripe fruit might produce a more acceptable product.

Cacao.

(See also 1981j, 1982a, c, f.)

1873. BYLES, L. A.

Trends in the production and consumption of raw cocoa.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 3-19.

An account is given of the history of cocoa production, consumption and prices with clear tables and graphs, and with special attention to the last 20 years. World production continued to rise until 1938/9 and then fell away to rise again in the last few years. The present high production is considered to be due to new plantings and intensive pod collection which are largely offsetting the decline in production in certain areas due to disease. Production in the West Indies has fallen heavily, while that of America has risen. West African cocoa still forms over half world production, but the percentage contribution of the Gold Coast has fallen from 43 to 34 while production in Nigeria, the Ivory Coast and French Cameroons has increased. World stocks of beans are smaller than before the war. C.W.S.H.

1874. COCOA CONFERENCE 1951.

[Symposium on] production [of cocoa] in new areas.

URQUHART, D. H.

Some notes on cocoa and its future prospects in the Far East.

HENDERSON, F. C.

The expansion of cocoa growing in Papua—New Guinea.

VOELCKER, O. J.

Cocoa planting material for Malaya.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 21-6, 26-34, 34-8.

The general position in new areas was first reviewed. There are good prospects for an appreciable expansion in New Guinea. In Malaya an experimental programme is under way and a 1,200-acre estate is being planted. Prospects of expansion exist in Ceylon, Java and the Solomon Islands. In the more detailed article on Papua—New Guinea attention was drawn to the large areas of virgin potential cocoa land available in addition to land already planted with coconuts in which cocoa could be interplanted. Interplanting with coconuts has been successfully practised for many years. Selection and the establishment of high-yielding clones has been undertaken. Labour is a limiting factor. Mention was made in the discussion of plots interplanted with rubber and with coconuts. These plots were neglected for 15 years but the cocoa survived much better in the coconuts than in the rubber. In the paper on planting material for Malaya it was pointed out that the true-breeding characteristic of Amelonado cocoa gave it a great advantage over Trinitario material, since importation, except from known virus-free areas, must be of seed only. C.W.S.H.

1875. PYNAERT, L.

Le cacao au Congo belge. (Cacao in the Belgian Congo.)

Rev. int. Prod. colon., 1951, 26: 260: 101-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 495.

Aspects of cacao production dealt with include varieties, grafting, control of *Sahlbergella singularis*, soils, root systems, selection and shade.

1876. GILLET, D.

A recent visit to the Belgian Congo.

Rep. *Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 132-4.

Good cocoa soils in the Belgian Congo are limited and patchy, but planting as an undercrop for oil palm or rubber plantations is feasible in some areas. Problems of fermentation and drying including the use of hot-air dryers on large estates are described. On one estate growing Trinitario cocoa pruning to prevent the appearance of a second tier of branches was practised, and harvesting was done by schoolchildren.

C.W.S.H.

1877. BALLEYGUIER, M. A.

Cocoa problems in French West Africa.

Rep. *Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 127-9, 131-2.

Production in French West Africa is rising steadily. Young trees are coming into bearing in the Ivory Coast and a production of 100,000 metric tons is soon expected. The swollen shoot menace, the Kongodia form being the severest, is serious. A disease resistant species is being sought and one tree has shown resistance for 3 years. Drying is being improved in the Cameroons. Marketing conditions are difficult, but roads are improving.

C.W.S.H.

1878. BOWMAN, G. F.

The Inter-American Cacao Center at Turrialba, Costa Rica.

Rep. *Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 40-56, bibl. in text.

A general description is given of the Cacao Centre which was established at Turrialba in 1947 to serve American countries which grow cocoa. Already 36 students from 14 countries have been trained for extension work. Many lines of research have been started and these include investigations into the physiology of flowering and fruiting, rehabilitation by pruning, selection, propagation, and control of *Phytophthora palmivora*. Notes are also included on work done in other American countries. A wooden frame propagator with plasticized wire screen is described.

C.W.S.H.

1879. SHEPHARD, C. Y.

A progress report on cocoa research at the Imperial College of Tropical Agriculture.

Rep. *Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 58-63.

Research on plant breeding, plant physiology, soil science, fermentation, entomology and plant pathology is reviewed. It has been found that progenies arising from selfings of two parent trees were less vigorous than those arising from crosses. Success in self-pollinations was highest when done in the early morning and declined when done at midday and again in late afternoon. Where small-scale propagators are used for rooting cuttings it has been found that overhead shade and bin covers can be replaced by a grade of jute cloth transmitting 600-700 foot candles at the brightest

periods of day and kept moist. For large-scale hardening of cuttings rooted in open spray beds a centrifugal humidifier has proved very satisfactory, the plants being placed in tiers in a glass-sided hardening house. Nutrient culture solutions are being used for the detection and description of deficiency symptoms and leaf injection for diagnosing mineral deficiency. Toxicity symptoms are also being studied. A technique has been evolved for curing mineral deficiencies in large trees by liquid injection. Studies on the effects of insolation and shade have so far indicated an interesting relationship between light intensity and nitrogen metabolism. A fifth species of mealybug, *Pseudococcus comstocki*, has been shown to be a vector of cocoa virus; further trials with *P. longispinus* and *Puto barberi* have proved negative. The use of bordeaux sprays, while significantly reducing pod losses through disease, also significantly reduced the number of pods reaching maturity; in the discussion that followed, Mr. West stated that bordeaux, but not Perenox, also caused a reduction in the number of pods at W.A.C.R.I.

1880. HARDY, F.

Cocoa manurial and cultural experiments at River Estate, Trinidad.

Rep. *Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 68-73.

The layout of the following experiments started between 1949 and 1951 is described: 1. Shade, spacing and fertilizer. 2. Leguminous and non-leguminous shade. 3. Tillage and manuring. 4. Spacing and mulching. 5. Size of planting hole. Other trials projected are a practical mulch, shade and NPK experiment and 3 identical micro-plot trials on different soils involving the use of bagasse and trace elements. One of the main purposes of these experiments is to trace the interactions between the atmospheric environment, the soil environment and the cocoa plant. The various measurements to be recorded are indicated.

1881. HARTLEY, C. W. S.

Cocoa investigations in Malaya.

World Crops, 1951, 3: 289-91, bibl. 6, illus.

In 1948 when Professor E. E. Cheesman's report was published the Department of Agriculture in Malaya had a few small trial plots of cacao of Trinitario type yielding well, and some 15,000 seedlings raised from pods imported from Ceylon. By 1950 nearly 50 blocks and experiments had been established over a wide area in which all potentially promising soil types were covered. Planting out seedlings in baskets has proved very satisfactory but costly, and efforts are being made to overcome difficulties in transplanting direct from nurseries or sowing at stake. Investigations are in progress on types of shade. Primary shade has been shown to retard growth and to encourage pests such as *Apogonia* spp. and other night-flying cockchafer and mealybugs. Replacing shade plants by artificial palm frond-shade led to an immediate improvement in growth and prevented further cockchafer attacks. Bananas and *Gliricidia* are being tried as secondary shade and such trees as *Peltophorum ferrugineum*, *Parkia speciosa* and *Albizia* spp. as permanent shade. Selection and breeding is being undertaken with local Venezuelan Criollo and Trinitario cacao and with Amelonado cacao recently imported from the Gold

Coast. Trials are in progress on propagation by cuttings, including single leaf cuttings, using overhead spray irrigation. Among diseases only red root disease, *Ganoderma pseudoferreum*, has so far proved serious, though *Marasmius semustus* has recently been found causing a fatal collar rot of seedlings. Among pests, in addition to leaf-eating cockchafers, *Helopeltis theobromae* has caused severe damage on pods.

1882. WEST, J.

Progress of research at W.A.C.R.I.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 108-11.

Cola chlamydanthra carries the swollen shoot virus and should be removed in cocoa areas. Transfer from *C. cordifolia* and *Ceiba pentandra* is uncommon. Possible mealy bug predators were imported from California but failed to become established after release. *Pseudophycus angelicus* has, however, been recovered twice from a release of 72,066 specimens. The painting of Kumikate, containing DDT, on young cocoa plants twice a year has proved a satisfactory control measure for capsid bugs. A disease classification of "black pod" has been made: *Phytophthora palmivora* is far the most important cause. Bordeaux and Perenox sprays reduced pod infection, but did not increase yield. A leaf cutting propagation technique is being used for building up clonal plots of selected strains. C.W.S.H.

1883. POSNETTE, A. F.

Progeny trials with cacao in the Gold Coast.

Emp. J. exp. Agric., 1951, 19: 242-52, bibl. 23.

Progeny trials of high-yielding cacao selections were planted between 1940 and 1943, using self-pollinated seed. The progeny of one Trinitario selection, E1, proved to be superior in yield and bean size to all Amelonado selections tested; on poor soil it was equalled by another selection from Nigeria, N38, which is probably partly Trinitario. In another progeny trial, the E1 progeny yielded more cacao than all other selections, but was slightly inferior to another Trinitario progeny when the log $(2n+1)$ transformation was applied to the individual tree yields. There was a positive correlation between the pod-weights of Trinitario clones and of their seedling progeny. A collection of various types of cacao was introduced to the Gold Coast from Trinidad in 1944. The Upper Amazon types were more vigorous, earlier bearing, and higher yielding than the Lower Amazon, Criollo, Ecuador, Trinitario, and West African Amelonado types. The best Upper Amazon progeny, a Nanay \times Parinari cross, gave a mean of 38 pods per tree at 5 years old, compared with 1.2 pods per tree for Amelonado seedlings in the same trial. The use of clonal seed in the replanting of cacao areas devastated by virus diseases is discussed in relation to these results. [Author's summary.]

1884. SCHULTES, R. E.

El genero *Herrania* pariente silvestre del cacao cultivado. (The genus *Herrania*, a wild relative of the cultivated cacao.) *Agric. trop. Bogotá, 1951, 7: 7: 43-8, bibl. 4, illus.*

Fourteen species of the genus *Herrania*, a very close relative of *Theobroma*, are indigenous in Colombia. Although some of the species are exploited by the natives, the genus has no commercial importance. The author considers, however, that it may prove very valuable for breeding disease-resistant cacao. Notes are given on the taxonomy, morphology and distribution of the species.

1885. GARCÍA, C., AND NAUNDORF, G.

Ensayos comparativos con las diversas fitohormonas en el enraizamiento de estacas de cacao. (Comparative trials with various growth substances for the rooting of cacao cuttings.) [English summary 5 lines.]

Not. agron. Palmira, 1950, 3: 191-4, bibl. 3.

At the Palmira Agricultural Experiment Station, semi-lignified cuttings of cacao were treated with the following 4 growth substances: 3-indoleacetic acid, 3-indolebutyric acid, α -naphthylacetic acid and 2,4-dichlorophenoxyacetic acid. 3-indolebutyric acid was the most active and markedly increased the rate and percentage of rooting and the number of roots produced. The dusting method of application was better than the dip method. 2,4-D proved toxic at the concentrations used.

1886. GARDNER, V. R., AND NAUNDORF, G.

El empleo de las fitohormonas para aumentar el cuajamiento de frutos en el cacao. (The use of growth substances to increase fruit set in cacao.) [English summary $\frac{1}{2}$ p.] *Not. agron. Palmira, 1950, 3: 175-84, bibl. 8.*

Four growth substances, in a range of concentrations from 10 to 100 p.p.m., were used on cacao flowers at the Palmira Agricultural Experiment Station. By using suitable concentrations, i.e. 25-50 p.p.m., it was found possible to double or even treble fruit set. The most satisfactory substances were para-chlorophenoxyacetic acid, alpha naphthaleneacetic acid and 2,4,5-trichlorophenoxypropionic acid. 4-chloro-o-toloxycetic acid was toxic in the concentrations used. The increased fruit set obtained appeared to be due to the prolonged period of receptivity of the flowers rather than to parthenocarpic development of the fruit.

1887. NAUNDORF, G., AND GARDNER, V. R.

Contribución al estudio de la fisiología del cacao (*Theobroma cacao* L.). Influencia de las diversas fito-hormonas sobre la caída prematura y marchitamiento de los frutos jóvenes. (A contribution to the study of cacao physiology. The effect of growth substances on premature fall and cherelle wilt of young fruits.) [English summary 8 lines.]

Not. agron. Palmira, 1950, 3: 185-7, bibl. 4.

A single application of 25-50 p.p.m. para chlorophenoxyacetic acid or 50-100 p.p.m. alpha naphthylacetic acid reduced the loss of cacao fruit due to cherelle wilt from 41.7-66.6% in untreated trees to 0%. 2,4,5-trichlorophenoxypropionic acid also controlled cherelle wilt effectively, but even at a concentration of 10 p.p.m. it scorched the leaves. 4-chloro-o-toloxycetic acid was less effective.

1888. POSNETTE, A. F., AND TODD, J. M.
Virus diseases of cacao in West Africa.
VIII. The search for virus-resistant cacao.
Ann. appl. Biol., 1951, 38: 785-800, bibl. 17.

Selection among trees surviving in farms devastated by this disease led to the discovery of mild virus strains which can protect trees against virulent strains. None of the selections showed any immunity or resistance except that conferred by previous mild-strain infection. A low degree of tolerance was found in some selections. Local selections and a range of new introductions were tested by mealybug infection, and only types from the Upper Amazon region of Ecuador were consistently resistant to infection.—West African Cacao Research Institute, Tafo, Gold Coast.

1889. ANON.
Swollen shoot disease of cocoa in West Africa. An important new development.
World Crops, 1951, 3: 262, bibl. 4.

This note refers to the successful results obtained in preliminary trials with soil applications of the new systemic insecticide Hanane, developed by Pest Control Ltd., against the mealy bug vectors of the swollen shoot virus of cacao. [See also next abstract and abstract 1897.]

1890. NICOL, J.
Systemic insecticides and the mealybug vectors of swollen-shoot virus of cacao.
Nature, 1952, 169: 120, bibl. 1.

Pseudococcus citri, *P. njalensis* and *Ferrisia virgata* infested cacao seedlings were grown in nutrient solutions to which varying amounts of insecticides were added. Bis(bis-dimethylamino) phosphonous anhydride was not successful in controlling the species tested at concentrations up to 100 p.p.m.; at higher concentrations, however, it was found more effective. Bis(dimethylamino)fluorophosphine oxide quickly showed signs of being effective at 10, 50 and 100 p.p.m., and the time for complete control varied from 2 to 6 weeks. At the 200 and 500 p.p.m. levels, the oxide was phytotoxic.—W.A.C.R.I.

1891. JOHNS, R., AND GIBBERD, A. V.
A review of the cocoa industry of Nigeria with special reference to the control of swollen shoot disease and the maintenance of production by rehabilitation and new planting.
HADLAND, J. R. G.
The methods and functions of the Nigerian Cocoa Survey.
Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 135-43, illus., 143-6.

Swollen shoot has not produced such widespread destruction in Nigeria as in the Gold Coast, and very virulent types are not present. A cutting out campaign has failed to bring the disease under control, owing to the fact that it is ineffective in areas of 30% or more initial infection, and owing to administrative difficulties. In 1950 a survey was undertaken and a sealing off policy begun, with a cordon sanitaire around the area of mass infection; in this belt close surveillance and control is maintained. Administratively this method has been easier and the disease has not increased. The capsid bug is the most serious pest of Nigeria.

On the question of rehabilitation, the importance of turning to plantation methods rather than continuing cultivation of the crop as a forest product is stressed, and a new section of the department has been set up largely to bring about this change. Improved planting material will be made available. In the second paper the methods of the cocoa survey are described. Staff work in groups in a block survey system, bush tracks are reconnoitred and several new cocoa-producing villages have been discovered. Difficulties include lack of suitable maps and the difficulty of detecting swollen shoot in its early stages. Observations and demonstration plots have been established, and methods of crop forecasting are being investigated. Quality is improving. C.W.S.H.

1892. BENSTEAD, R. J.
Cocoa re-establishment.
Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 111-16.

The most successful re-establishment of cocoa in swollen shoot areas has been on land immediately replanted after carrying secondary bush. Food farming prior to replanting makes establishment difficult. Establishment is most satisfactory with indigenous shade trees or oil palms, and after grasses have been smothered with *Gliricidia maculata* or "tree cassava". Re-infection is confined to the perimeter of the area and does not spread until a closed canopy has formed. Hand painting of seedlings twice a year with DDT emulsion is effective against capsids. C.W.S.H.

1893. OWEN, H.
Cacao pod diseases in West Africa.
Ann. appl. Biol., 1951, 38: 715-18, bibl. 2.

Only one fungus disease of cacao pods is of any importance in West Africa. This is "black pod" disease caused by *Phytophthora palmivora*. On observation plots at Tafo it was found that nearly 10% of the total crop was destroyed by this disease. The incidence of black pod disease is influenced considerably by the weather and particularly by the rainfall; temperature is not a critical factor. To reduce losses by this disease frequent harvesting, at intervals of about a week, would appear to be a worthwhile measure, especially when there is excessive rainfall during the early part of the season.

1894. DE BELLEFROID, M. V.
A note on *Sahlberghella singularis*. [French and English.]
Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 130-1.

The most serious pest in the Belgian Congo is the capsid bug, *Sahlberghella singularis*, which, though it has been troublesome for over 20 years, has only recently been brought under control by Gammexane with 6% gamma isomer (Nioka) at 20-50 g. per tree according to age, applied by bellows. One man does 2½ acres per day. C.W.S.H.

1895. VAN DER KNAAP, W. P.
Een nieuwe plaag in jonge cacao-aanplanten ? (A new pest of cacao ?)
Bergcultures, 1952, 21: 19-20, bibl. 4, illus.

In many young cacao plantations in Java it was observed that the growing points of the shoots did not develop or the tips were curled. These symptoms

mostly occurred in low-lying, dry plantations with little shade. The trouble is thought to be caused by mealybug attack, probably that of *Pseudococcus citri* or *Ferrisia virgata*.

1896. BETREM, J. G.

The control of the mosquito blight on the cacao in Java.

Proc. 8th int. Congr. Ent. Stockholm, 1948, 1950, from abstr. in Rev. appl. Ent., 1951, 39: 297-8.

Helopeltis antonii and *H. theivora* are both common, but the former is the more abundant and injurious. It attacks and sometimes destroys the young shoots and also feeds on the pods in all stages of development. Experiments showed hand collection to be of no value in control on large trees. Fortunately applications of a derris dust containing 0.75% rotenone begun when the bugs become too numerous, give satisfactory control if the derris powder has a rotenone content of at least 4% and its particles pass a 200-mesh sieve. Talc and local volcanic ash were equally satisfactory as carriers in field experiments.

1897. WEST, J.

Progress of work at WACRI on systemic insecticides carried out with Pest Control, Ltd.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 86-92.

The systemic insecticide CR409 (Hanane) was applied as a liquid poured into shallow trenches round trees. Pre-treatment and post-treatment mealy bug counts were made in both the treated plot and among control trees. It was calculated that CR409 had produced 99.9% mortality. The 35 survivors were all crawlers. An experiment in an infested cocoa farm showed that infestation of trunk pods was reduced to 6.2% in six weeks and to 0.6% six weeks after a second treatment. In the discussion that followed it was stated that the American Food and Drug Administration have laid down that no beans with more than 0.1 p.p.m. CR409 can be accepted. Improvements in the methods of isolation of CR409 may show that it is possible to keep below this limit.

1898. DE WITT, K. W., AND COPE, F. W.

Notes on the quality factor in Trinidad cocoa.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 64-8, bibl. 16.

This paper is divided into two parts. In the first the literature on the biochemical factors affecting cocoa quality is reviewed. In the second the problem of quality is discussed from the standpoint of the plant breeder, and it is pointed out that there is no information available at present on the genetics of quality. Research into the genetics of flavour can only be prosecuted successfully after all processes involved in the preparation of test samples have been standardized.

1899. FORSYTH, W. G. C., AND ROMBOUTS, J. E.

Our approach to the study of cocoa fermentation.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 73-81, bibl. 9.

From studies made by the Colonial Microbiological

Research Institute, Trinidad, it is concluded that the fermentation of the cotyledons of cocoa beans takes place in the almost complete absence of oxygen. The most striking chemical change is the conversion of the simple cyanadin compounds to complex products. These products are easily oxidized, and therefore, it is suggested, oxygen must be excluded in any process designed to simulate commercial fermentation.

1900. MEJÍA LIÉVANO, E.

Efecto de las revolturas sobre la temperatura y el pH durante la fermentación del cacao.

(The effect of stirring cacao during fermentation on the temperature and pH of the ferment.)

Acta agron. Palmira, 1951, 1: 183-203, bibl. 12, illus.

Amelonado cacao was fermented for 120 hours and stirred at 6, 12 or 24 hour intervals. The best result was obtained with stirring every 12 hours, a maximum temperature of 48-50° C. being reached in 60-80 hours when 66 kg. fresh cacao was fermented in a double-walled container. With stirring every 6 hours temperatures of about 48° C. were also reached but only after 70-96 hours. Lower temperatures were reached with less frequent or no stirring. Temperatures at the centre of the mass of cacao were generally higher than those at the bottom. A positive correlation was found between the internal temperatures of the mass and the temperature of the surrounding air. The pH increased as the process of fermentation advanced. Observations were made on the physical changes occurring in the cacao during fermentation.—Interamer. Inst. agric. Sci., Turrialba, Costa Rica.

1901. PLATONE, E.

Anomalías en la humedad de las almendras del cacao durante el beneficio. (Anomalies in the moisture content of cacao beans during fermentation.)

Acta agron. Palmira, 1951, 1: 213-29.

Although cacao beans lose water during fermentation it was found that during the first day of fermentation their moisture percentage was higher than that of fresh beans. This is explained by the fact that loss of dry matter, especially carbohydrates, is very great during the first day of fermentation and exceeds loss of moisture. As the cuticle originally contains nearly twice as much moisture as the cotyledons, an equal loss of dry matter results in a higher moisture percentage in the cuticle than in the cotyledons and an osmotic disequilibrium is set up. Water passes from the cuticle to the cotyledons (thus explaining the rise in water content of the cotyledons until the end of fermentation) and soluble substances such as minerals and tannins pass from the cotyledons to the cuticle. The data obtained in this study are presented in the form of tables and graphs.

1902. MACLEAN, J. A. R., AND WICKENS, R.

Small scale fermentation of cocoa.

Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 116-23.

Laboratory fermentations of cocoa and fermentations of 20-40 lb. wet samples in a solar fermentary are described and the apparatus used illustrated. The condition of the cocoa depended on degree of ripeness, length of time between harvesting and breaking, and

on the variety of cocoa, though this latter factor did not enter in when the uniform West Africa Amelonado cocoa was used. Pulp reducing sugars and purple bean percentage were related in basket fermentation.

C.W.S.H.

1903. MACLEAN, J. A. R., AND WICKENS, R.
The assessment of cocoa quality by local
"taste panels".

*Rep. Cocoa Conf. Lond., 1951, Cocoa, Choc.
& Confect. Alliance Ltd., 1951, pp. 124-7.*

Attention is drawn to the difference between British and American methods of recording flavour. A local "taste panel" at W.A.C.R.I. assessed amelonado samples by allotting points for appearance, aroma and taste of unroasted beans. Liquors from roasted beans were also assessed. The optimum "lay-out" and number of tasters needs to be determined and a range of roasting times is desirable.

C.W.S.H.

1904. SOMADE, B.
Contamination and taint of cocoa beans by
residual insecticides.

J. Sci. Food Agric., 1951, 2: 527-8.

In an experiment lasting three weeks, cocoa beans were stored and carried to port in Southern Nigeria in sacks which were impregnated with DDT and BHC. In this period the amount of impregnated DDT fell from 3.45% to 2.8% and that of BHC from 1.65% to 0.93%. The amount absorbed by the cocoa was within the limits allowed in the U.K. Most of the absorbed insecticide was retained by the testa. Similar results were obtained when cocoa beans were stored in contact with floors and walls treated with heavy dosages of these insecticides. [Author's synopsis.]

Cinchona.

(See also 1981e.)

1905. ANON.
Madagascar; le développement de l'exploita-
tion du quinquina. (The development of
the cinchona industry in Madagascar.)
Marchés colon. Monde, 1951, 7: 291: 1627,
from abstr. in *DocumBl. trop. Prod. Amst.,*
1951, 6: 467.

An account is given of the work on the cinchona research station in Diego-Suarez with *C. ledgeriana* and *C. succirubra*.

1906. ANON.
A la station quinquina de Dschang. (The
cinchona research station at Dschang.)
Bull. Inf. Doc. Haut Comm. Rép. fr.
Cameroun, 1951, 7: 911, from abstr. in
DocumBl. trop. Prod. Amst., 1951, 6: 311.

Research on cinchona was started at Dschang in the Cameroons in 1922. There is now a collection of 50 varieties.

Coconuts.

(See also 1981t, x, 1982h.)

1907. COOKE, F. C.
Research progress, 1930-1951.
Ceylon Coconut Quart., 1951, 2: 7-10.

An outline of work, past and present, of the Coconut Research Scheme, Ceylon, and plans for the future.

1908. ANON.

The rejuvenation of Ceylon's coconut plantations.

World Crops, 1951, 3: 394-6, illus.

A commission appointed to enquire into the coconut industry of Ceylon reported in 1949 that, out of a total of about 1,100,000 acres under coconuts, 420,000 acres consisted of trees over 60 years old and needed to be replanted. Between March 1949 and October 1951, 22 nurseries were established from which carefully selected block nut seedlings are to be sold to growers at a subsidized price. The demand for plants has so far exceeded the supply and further nurseries are to be established.

1909. COCONUT RESEARCH INSTITUTE.*
The present cost of opening-up a coconut
estate.

Ceylon Coconut Quart., 1951, 2: 93.

Estimated capital costs of planting and development of 100 acres for 7 years are tabulated.

1910. FERNANDO, W. V., AND JAYAWARDENE,
O. D. S.

Planting systems—Part II.

Ceylon Coconut Quart., 1951, 2: 21-2.

There are two short articles under this title. [For Part I, see H.A., 21: 1038.] The first author makes a plea for spacing of not less than 22 ft. on poor land and 24 ft. elsewhere, whereas in some parts of Ceylon coconuts are found planted less than 6 ft. apart and yielding not more than 2-3 nuts per annum; inter-planting with deep-rooted trees is also clearly detrimental. The second author recommends triangular planting in place of the square planting commonly used.

1911. PERKINS, C. A. R.
Water conservation on steep slopes

Ceylon Coconut Quart., 1950, 1: 4: 23-4,
illus. [received 1952].

The method of lock and spill drains combined with planting young coconuts on reverse-slope platforms, which was used in underplanting 60-year-old palms on a steep hillside, is described.

1912. SALGADO, M. L. M.
Cover crops for coconuts.

Ceylon Coconut Quart., 1951, 2: 73-5.

The use of leguminous cover crops is recommended for the wetter parts of Ceylon, the best plants being *Calopogonium mucunoides*, *Centrosema pubescens* and *Pueraria phaseoloides*. Suggestions are made for planting these crops and their subsequent treatment.

1913. AMBROSE, C.
"Bissa."

Ceylon Coconut Quart., 1951, 2: 91-2.

"Bissa" is a thick mat of roots forming a circle several feet in diameter round the base of sickly palms. Observations suggest that the cause is waterlogging.

1914. MESA-BERNAL, D.

Consideraciones sobre la enfermedad del cocotero denominada comunmente "enanismo de la hoja", "hoja pequeña" o "porroca". (Considerations on the so-called "little leaf" disease of coconuts.)
Agric. trop. Bogotá, 1951, 7: 9: 37-42,
10: 45-50, 11: 39-42, illus.

* Formerly Coconut Research Scheme (Ceylon).

A review of the distribution of the disease in Colombia, the symptoms, and the literature on the possible causes. The most probable causes of the trouble appear to be bacteria, a trace element deficiency, lack of water or a combination thereof. The evidence is discussed.

1915. MEIFFREN, M.

Note préliminaire sur l'étude de la maladie des cocotiers au Togo. (A preliminary note on the study of the coconut disease in Togo.) *Agron. trop.*, 1951, 6: 163-72, bibl. 7, illus.

The symptoms of a disease which is causing concern among coconut growers in Togo resemble closely, though not in every respect, those described by Leach in Jamaica for the "unknown disease" [see *H.A.*, 16: 2236]. A study on the spread of the disease showed this to be similar to that due to a parasitic organism. Tests for a virus by sap inoculation and a form of grafting gave negative results. Cultures of tissues from diseased trees yielded several fungi, notably a strain of *Fusarium oxysporum*, but it is not yet clear if the fusarium is the primary cause of the trouble. Conditions favouring the disease appear to be drought and shortage of P_2O_5 , especially where K_2O is high. On the assumption that the fusarium is the main cause, trials have been started in which the organic fungicide Cryptonol (neutral ortho-oxy-quinoline sulphate) is being injected into the trunks.

1916. AMBROSE, C.

The destruction of ant-hills.

Ceylon Coconut Quart., 1951, 2: 11-13, illus.

The damage caused to coconut palms by termite colonies situated near to them is described. The colonies can be destroyed by applying solutions of naphthalene or paradichlorobenzene, or by scooping out the surface of the mounds at the onset of heavy rains so that water is drained into the galleries. Cymag, Gammexane D 025 and chlorination did not give satisfactory destruction.

1917. COOKE, F. C.

Research on coconut products.

Ceylon Coconut Quart., 1950, 1: 4: 31-4, bibl. 15 [received 1952].

A brief review, with references to the relevant published papers, is given of past laboratory scale work carried out by the Coconut Research Scheme up to 1949 on soap, coconut shells, vinegar, arrack, copra, coconut oil, desiccated coconut, coir and coir dust, and fire-proofing coir fibre.

1918. FREDERICK, W. D.

The Ceylon copra kiln.

Ceylon Coconut Quart., 1950, 1: 3: 21-3 + plans [received 1952].

The standard Ceylon kiln is a simple structure and details are given here of its specifications with plan and elevations, the materials used in its construction with quantities of each, and its operation including a working programme.

1919. HUDSON, J.

The coconut coir industry in Ceylon.

World Crops, 1951, 3: 107-10, bibl. 1, illus.

This paper contains an account of methods of retting and milling of coir and the subsequent cleaning, drying, and baling of both bristle and mattress fibres in Ceylon.

Coffee.

(See also 1854, 1981g, k, 1, s, 1982 l, 2011.)

1920. DE OLIVEIRA, P., AND LEMOS, C.

A cultura cafeeira em solo do arenito Baurú. (The cultivation of coffee on "arenito Baurú" type soil.)

Bol. Super. Serv. Café, S. Paulo, 1951, 26: 636-53, bibl. 11.

The physical and chemical properties of a typical, highly erodable coffee soil in the State of São Paulo, Brazil, are described, and the potentialities of the soil for coffee growing are discussed.

1921. PEREZ, V.

Prácticas de conservación de suelos para cafetales. (Soil conservation practices for coffee.)

Suelo Tico, 1951, 5: 129-36, illus.

The chief soil conservation practices that can be used in coffee plantations are described and their adaptation to Costa Rican conditions discussed. The following measures are dealt with in turn: contour planting, draining and ditching, terracing, strip cropping and cover cropping.

1922. G., M. M.

Desenvolve-se em Caçapava uma clássica experiência de sombreamento de cafezais. (A classical shading experiment with coffee in Caçapava.)

Reprinted from *Fôlha da Manhã*, 26 October 1951, in *Bol. Super. Serv. Café, S. Paulo*, 1951, 26: 944-6.

The question of shading coffee plantations in São Paulo, Brazil, is a controversial one. A case is quoted here of a 25-year-old plantation in Caçapava which had been grown in full sun and become unproductive and which was restored to productivity by establishing an *Inga* shade. Maintenance costs were considerably lower after the establishment of shade and pests were less troublesome.

1923. CORRÊIA NETO, P.

O sombreamento dos cafézais. (Shading coffee.)

Reprinted from *Fôlha da Manhã*, 12 August 1951, in *Bol. Super. Serv. Café, S. Paulo*, 1951, 26: 750-2.

The author cites examples in support of his theory that giving 50% shade to coffee plantations is the best method of increasing yields and controlling pests and diseases.

1924. TOSELLO, A.

Ensaio sobre a colheita do café. (Coffee harvesting trials.)

Bol. Super. Serv. Café, S. Paulo, 1951, 26: 826-8, bibl. 3.

The total man hours required for harvesting coffee by 2 different methods were compared in an experiment in Ribeirão Preto, Brazil. In the first method, which consisted of shaking the coffee onto the ground, raking it to separate it from refuse, and finally sieving it, 53 trees were harvested in 10 man hours. In the second method, which consisted of shaking the coffee onto cloths and sieving it, only 40 trees could be harvested in 10 man hours but the coffee was of better quality and the subsequent operations of preparation were easier.

1925. WELLMAN, F. L.
Dissemination of *Omphalia* leaf spot of coffee.
Turrialba Rev. Inst. interamer. Cienc. agric., 1950, 1: 1: 12-27, from abstr. in *Rev. appl. Mycol.*, 1952, 31: 15.
- In experimental plantings at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, lesions produced on Arabigo coffee leaves by *Omphalia flavida* [*Mycena citricolor*] were found to spread from evident old foci of infection, from one part of a tree to another, and in all directions in the field, though the range of movement was narrow. Severity of infection was definitely correlated with the presence of shade over the trees. Effective barriers to the spread of the pathogen are plants of the broad-leaved *Heliconia acuminata*, roadways 10 to 13 m. and upwards in width, pastures, and small fields of cultivated crops.
1926. WELLMAN, F. L.
Control del ojo de gallo, *Omphalia flavida*, por medio de la deshoja de cafetos enfermos. (Defoliation as a means of controlling *Omphalia flavida* on coffee trees.)
Suelo Tico, 1951, 5: 42-51, bibl. in text, illus.
- A fuller account of the work summarized in *Phytopathology*, 1951, 41: 38 [*H.A.*, 21: 3016].
1927. ABRAÃO, J.
A "podridão das raízes" do cafeeiro. (Root rot of coffee.)
Reprinted from *Fôlha da Manhã*, 21 July 1951, in *Bol. Super. Serv. Café, S. Paulo*, 1951, 26: 738-9.
- Incidence of root rot, caused by *Rosellinia* sp., has been seriously increasing in São Paulo, Brazil, in recent years. This is thought to be the result of extensive planting of coffee on cleared forest land in which *Rosellinia* abounds as a saprophyte. Three or four years after coffee has been planted the fungus becomes parasitic on the roots and causes a yellowing of the leaves, leaf fall and the production of small, malformed fruits. The old methods of control by soil applications of carbon bisulphide, copper sulphate or sulphur are unsatisfactory. The advice is given to remove all diseased trees and roots in the infected area and to apply quick lime at the rate of 500-700 g. per sq. m. at the beginning of the rainy season. The area can be replanted 2 months after liming.
1928. ANON.
O polvilhamento do cafézal com B.H.C. deve ser feito no momento do trânsito da broca. (BHC dusts should be applied to coffee at the moment when the adult berry borers leave the fruit.)
Reprinted from *Correio Paulistano* in *Bol. Super. Serv. Café, S. Paulo*, 1951, 26: 857-8.
- Failure of BHC dust to control coffee berry borer is attributable in many cases to tardy application. It should be applied at 1.0-1.5% of the gamma isomer when the adults are emerging from the old fruit and some of the previous year's infestation are observed attacking the young fruit. A second application should be made 12-20 days later. If these dusts are well timed a third application may not be necessary.
1929. MORALES, E.
Informe sobre la "vaquita del café". (A report on the coffee pest *Rhabdopterus jansoni* Jac.)
Suelo Tico, 1951, 5: 191-4.
- Rhabdopterus jansoni* (= *Rhabdophorus jansoni*), a beetle, occurs as a pest of coffee in Nicaragua, Colombia, Costa Rica and North Brazil, attacking the leaves and fruit. In some cases as much as 50% of the fruit is damaged. The pest and the damage caused are described. Good control has been obtained in some cases with 7% chlordane dusts applied in the morning. Toxaphene and Agrocide also gave a certain degree of control. In Colombia arsenates are used with success. It is advisable to keep infested plantations free from weeds, as these harbour the larvae.
1930. FERRAZ DE AMARAL, J.
O ácaro dos cafézais. (Coffee mite.)
Bol. Super. Serv. Café, S. Paulo, 1951, 26: 846-8.
- Experiments made by the Biological Institute, São Paulo, have shown that 25% sulphur dust is as effective as 40% sulphur dust for controlling the coffee mite, *Paratetranychus ununguis*.
- Guavas.**
(See also 1982j.)
1931. ROY, R. S., AND AHMED, S. F.
Description of Bihar guava varieties.
Indian J. Hort., 1951, 8: 3: 22-3.
- Descriptions, in tabular form, are given for 4 guava varieties, Harijha, Safeda, Bahshi and Seedless, which are being used at Sabour in hybridization work.
- Mangoes.**
(See also 2004.)
1932. SINGH, L. B.
Mango grafting in eight weeks.
Science, 1951, 114: 393, illus.
- The author describes a successful technique tried at Saharanpur, U.P., India. Mango stones planted in early July started germinating at the end of the month. Seedlings were 1 ft. high and $\frac{1}{2}$ - $\frac{3}{4}$ in. in diameter 30 days from germination. One hundred such seedlings, including stones and sprouting roots, were lifted and the soil clinging to the stones was removed. The stones were covered with wet sphagnum moss $\frac{1}{2}$ in. thick, held in place by a thin string. They were taken to the parent tree and inarched with new shoots of the same thickness in early September. Rapid union took place, and at the end of the month the grafts were detached from the mother plant and potted. 80% success was achieved. The whole operation took place during the rainy season, rain water absorbed by the moss affording all the moisture necessary.
- Oil palms.**
1933. ANON.
Le palmier à huile au Cameroun. (The oil palm in the French Cameroons.)
Oléagineux, 1952, 7: 28-30, illus.
- The oil palm grows wild in fairly dense stands throughout the greater part of the equatorial forest zone in the French Cameroons. It is estimated that crops are

harvested more or less regularly from 30 to 35 million trees which receive practically no other attention from the inhabitants. There are also some plantations with a total area under palms of about 6,500 ha. A programme was started in 1950 which includes the establishment of experimental stations, an organization to encourage the best possible exploitation of wild palms and their progressive transformation into plantations, the development of a large plantation in the hinterland and the construction of modern factories and storage facilities. The main obstacle to progress at present is the relatively low value of palm oil as compared with such products as cacao and coffee, which has led to a shortage of labour.

1934. GUÉRARD, R.

La régénération de la palmeraie dahoméenne et l'accroissement de la production de l'huile et des amandes de palme. (**The rehabilitation of the oil palm industry in Dahomey and steps being taken to increase the production of oil and palm kernels.**)

Agron. trop., 1951, 6: 66-71.

This paper was originally presented to the African Conference on indigenous rural economy, held at Jos, Nigeria, in November 1949. Measures designed by the administration to produce quick results among the dense stands of wild palms found in the coastal regions of the country include the thinning out of excessively dense stands, planting up gaps in thin stands, the application of fertilizers, particularly potash, the construction of modern factories for extracting the oil and the provision of facilities for bulk storage at the port. The long-term programme includes the establishment of plantations in areas which at present do not grow oil palms and in flooded areas after these have been drained. The progress made so far is outlined.

1935. FERRAND, M., BACHY, A., AND OLLAGNIER, M.

Les oligoéléments dans la fumure du palmier à huile au Moyen Congo. Leur influence sur la santé des arbres. (**The effect of minor elements on the health of oil palms in the French Congo.**)

Oléagineux, 1951, 6: 629-36, bibl. 5.

Three years' results are reported on a manurial trial carried out on oil palms in very poor condition on an estate at Etoumbi in the French Congo. The treatments were no manure, N as sulphate of ammonia+P as rock phosphate+K as muriate of potash, and NPK plus each of the following elements separately: Zn, Cu, Fe (from 1950 only), Mg, Mn and B. Apart from B, which was applied in the form of boracic acid, all the minor elements were in the form of sulphates. These were all applied at the rate of 250 g. per tree per annum at a depth of 15 cm. and in a circle 2 to 2.5 m. from the trunks. NPK alone had no effect on yields, but with each of the minor elements (except Fe for which no results are yet available) added to NPK there were significant increases in yield in the second or third year or both. By the third year these ranged from 42% to 64%. This astonishing result is attributed to the exceptionally degraded and leached condition of the soil. Detailed records were also kept on the health of the trees. At the outset many trees exhibited symptoms of the disorder known as "Boyomi". A sanitary

index kept on each tree yearly showed that by the third year about 70% of the trees had improved markedly particularly following the application of Mg and Mn, about 20% showed little change and about 10% were still deteriorating.

1936. CHEVAUGEON, J.

Principes de lutte contre les pourridiés du palmier à huile. (**Control measures against root diseases of oil palms.**)

Oléagineux, 1952, 7: 25-7, bibl. 8.

It is suggested that where forest land is newly cleared preparatory to planting oil palms, root rots caused by *Fomes* spp. and *Armillaria mellea* could be largely prevented by following the Malayan practices of girdling and poisoning the larger trees with 3% sodium arsenite some months before they are felled to reduce the food reserves in their roots, and by first planting a susceptible short-term crop, such as cassava, to indicate where centres of infection exist. In mature plantations isolated cases can be dealt with by the usual method of digging out and burning the diseased trees and surrounding the area with a trench. With deep-rooted species in deep soils, however, infection may spread, as new roots extend under the trenches, and in such cases it would probably be best to fill them in after a few weeks and re-open them periodically to cut roots spreading into the infected areas: It would also be worth investigating the effect of poisoning infected trees and their immediate neighbours with sodium arsenite as a possible alternative to digging out and trenching. Diseased patches can be treated with formaldehyde or Cryptonol, and, if the disease has not appeared in neighbouring trees, they may be replanted the following year. In conclusion a list is supplied of plants susceptible to *Leptoporus (Fomes) lignosus*.

1937. KEHREN, L.

Étude sur la nature pectique du ciment intercellulaire de la pulpe du fruit de palme. (**A study on the pectic nature of the intercellular cement in the pulp of oil palm fruits.**)

Oléagineux, 1952, 7: 33-6, bibl. 8, illus.

In an earlier paper [see *H.A.*, 21: 1080] the important part played by pectic compounds in the process of extracting palm oil was stressed. In the present paper the author demonstrates the existence of pectin in the intercellular cement that binds together the cells of the pulp. Laboratory tests were carried out on the effect of adding substances known to affect pectins at the outset of the grinding and kneeding process which expresses the oil from the cells. It was found that the addition of substances that dissolved pectin led to the breakdown of the intercellular cement, and individual cells became separated and were removed in the sludge before their oil had been expressed. On the other hand, when pectin was converted to insoluble pectate the intercellular cement was strengthened and a better extraction of oil resulted.

1938. CUVIER, P., AND SERVANT, M.

La teneur en carotène des tourteaux de palme. (**The carotene content of palm kernel cake.**)

C.R. Acad. Sci. Fr., 1951, 233: 1386-8, reprinted in *Oléagineux*, 1952, 7: 81-2.

About 10% of the oil in oil palm kernels remains in the

residue left after expression. The extraction of this residual oil by solvents has shown it to be more highly pigmented than the expressed oil and to contain from 0.2% to 0.56% carotene compared with 0.03% to 0.2% in expressed oil. The difference is explained by the fact that in expressing oil most of the pigments in the epidermis are left in the residue, whereas in extracting oil by solvents the pigments are dissolved with the oil. Absorption spectra have shown the pigments in the two oils to be identical, the difference being, therefore, one of quantity only.

Papaws.

1939. CAMPACCI, C. A.

Ocorrência de *Phytophthora parasitica* Dast., em mamoeiro. (The occurrence of *Phytophthora parasitica* on papaws.) *Biológico*, 1951, 17: 142-3, illus.

A stem infection of papaws, causing discoloured, watery patches which could eventually encircle the stem and cause the trees to wither, has recently been reported for the first time in the state of São Paulo. It is possibly also its first appearance in Brazil. The causal agent was identified as *Phytophthora parasitica* Dast. Infection usually occurred in the region of the collar and, contrary to experience in other countries, has not been found on fruits or leaves. Preventive measures recommended include disinfecting the seed with copper or organic mercurial fungicides, establishing nurseries on open, well-drained sites, applying 0.5% bordeaux mixture or sulphur dust in the nursery, removing any infected trees and never forming an irrigation basin round the trees. Cutting out the infected part and painting the wound with bordeaux paste has proved an efficient curative treatment with 2-year-old trees.

Pineapples.

(See also 1982d, i.)

1940. PY, C.

Essai d'amélioration de la culture de l'ananas en Guinée française. (An attempt to improve pineapple culture in French Guinea.) *Fruits d'Outre Mer*, 1951, 6: 235-7, illus.

The methods adopted at the Central Station of the I.F.A.C. in French Guinea to produce a uniform stand of pineapples suitable for experimental purposes are described with reference to preparation of the land, the selection and preparation of suckers, planting and basic manurial treatments.

1941. CYKLER, J. F.

Energy requirement for shearing pineapple. *Agric. Engng St Joseph*, 1951, 32: 504, illus.

An agricultural engineer at the Pineapple Research Institute of Hawaii describes trials on several 3-lb. Cayenne pineapples to determine the energy necessary to shear a pineapple, to remove the crown at its junction with the fruit and to remove the crown by lever action on the crown $1\frac{1}{2}$ in. from the junction of the crown with the fruit.

1942. BOULAIS, J.

Lavage des ananas. Un prototype pour l'usine pilote de la station centrale de l'I.F.A.C. (Washing pineapples. A prototype machine for the pilot plant of the Station Centrale of the I.F.A.C.)

Fruits d'Outre Mer, 1951, 6: 334-5, illus.

The machine, which is described and illustrated, has proved most efficient in several trials for washing pineapples before processing. Its output of about 300 fruits an hour could be increased considerably if adapted for industrial purposes.

Rubber and other laticiferous trees.

(See also 1981t, 1982g, k.)

1943. ANON.

Caoutchouc au Cameroun. (Rubber in the Cameroons.)

Bull. Inf. Doc. Haut Comm. Rép. fr. Cameroun, 1951, 8: 40-53, from abstr. in *Documbl. trop. Prod. Amst.*, 1951, 6: 312.

A survey is made of the exploitation of native rubber in the Cameroons at the beginning of the century, the European cultivation of hevea and the recently established native plantations. The policy is now to plant hevea in the natural rubber areas. Introduced clones are being tested.

1944. SCHWEIZER, J.

Aanbevelen heveaplantmateriaal 1951/1952. (Recommended hevea planting material 1951-52.)

Bergcultures, 1951, 20: 377-81.

Notes are given on the performance of hevea clones and seedlings tested at the C.P.V. Research Station, Java, during the year.

1945. WARMKE, H. E.

Studies on pollination of *Hevea brasiliensis* in Puerto Rico.

Science, 1951, 113: 646-8, bibl. 6.

In co-operative work of the Division of Rubber Plant Investigation, Beltsville, Md, and the Mayaguez Experiment Station, Puerto Rico, evidence was found that the effective pollinating agents of *Hevea brasiliensis* were midges of the same family, Heleidae, as those responsible for cacao pollination in Trinidad.

1946. WIERSUM, L. K.

Stimuleren van de latex-productie. (Stimulation of latex production.)

Bergcultures, 1951, 20: 395-9, bibl. 7.

A recent article in the Malayan press claimed that latex yield of hevea trees could be increased 20% by cutting away the corky bast layer below the tapping cut and smearing the wound with one of the proprietary hormone preparations Eureka or Stimulex. The effect was said to last 3 months. The composition of the preparations and experimental results were not given. The author here gives a warning against the use of these preparations without further trial, and discusses the possible mode of action of the treatment. Previous work on the stimulation of latex production by cutting away the corky layer, applying vegetable oils, 2,4-D, cow manure or trace elements is reviewed.

1947. GIESBERGER, G., AND MANSVELT BECK, F. W. J.

Enkele opmerkingen over de grootte der taptaken. (Observations on the number of rubber trees tapped per worker per day.)

Bergcultures, 1951, 20: 293-5.

In Sumatra before the war it was usual for one worker to tap about 300 rubber trees a day. The shortage of labour since the war has led to this number being increased to 500-600, with the result that many trees are tapped too late in the day to give maximum yields. Factors affecting speed of tapping are discussed and the time taken over the various component operations is recorded.

1948. RUBBER RESEARCH INSTITUTE OF MALAYA.

Pink disease.

Circ. Rubb. Res. Inst. Malaya 33, 1951, pp. 6.

A description of the symptoms of pink disease of rubber caused by *Corticium salmonicolor* is followed by notes on the course of the disease and its treatment and control. In early stages and on young rubber it is curable by painting or spraying with bordeaux, or painting with Fylomac or one of the specified water miscible tar-acid fungicides. If not discovered till later it must be cut out. In mature rubber, neither bordeaux nor the tar-acids should be used. There, if infection is recent, a branch may be treated with asphalt-kerosene mixture or a proprietary substance known as Cargilineum. If infection has gone too far the branch must be removed.

1949. VOLLEMA, J. S.

Over een tot dusver niet bekende wijze van optreden van de schimmel *Ustulina maxima* in rubbertuinen. (On a hitherto unknown type of infection by *Ustulina maxima* in rubber gardens.)

Bergcultures, 1952, 21: 20-1.

A stem infection of hevea trees has been observed in Indonesia which causes a scaling of the bark and an efflux of latex. It usually occurs at a height of 3-6 m. and often at the branch crutches. It was found to be caused by the wound parasite *Ustulina maxima*, the causal agent of root collar rot. It is recommended that the wounds from cut or broken branches and all infected bark should be smeared with coal tar. On badly infected trees the infected patches should be painted to prevent the spread of spores, and the trees then grubbed and burnt.

Sugar cane.

(See also 1981a, b, c, h, i, p, q, u, w, y, z, 1982b, m, n, o, 2012.)

1950. BUZACOTT, J. H., AND HUGHES, C. G.
The 1951 cane collecting expedition to New Guinea.*

Cane Grs' quart. Bull., 1951, 15: 35-72.

The greater part of this paper consists of a popular account of the expedition sent by the Queensland Bureau of Sugar Experiment Stations to New Guinea to search for new breeding material. The role of cane in the lives of the highland natives is also described in

* See also H.A. 22: 1022.

some detail. The canes collected included 138 noble types and 24 others belonging to *S. spontaneum* or *S. robustum* as well as 3 varieties of *Miscanthus*. A table lists these canes, giving their probable species, native name, area in which collected, Brix, and notes on diseases observed and other particular characteristics.

1951. DU TOIT, J. L.

Annual summary of agricultural data for the sugarcane crop 1949-50.

S. Afr. Sugar J., 1951, 35: 519-25.

Includes a brief survey of varieties, area of cane harvested and yields obtained in South Africa by European planters.

1952. DE SORNAY, A.

La sélection de cannes de graines en repousse. (The selection of seedling raton canes.)

Rev. agric. Maurice, 1951, 30: 120-4.

In Mauritius the cane breeding programme is complicated by the need to raise canes that ratoon as well as, or better than, the standard variety M.134/32. The genetical basis for selection and the method of procedure adopted are discussed. Studies have shown that both with weight and Brix the correlation between plants and their ratoons is too small to make selection based on plants alone satisfactory. Selection based on ratoons has several other advantages which are described, and it is pointed out that over a 7-year period only 19% of the seedlings selected as plants were re-selected as first ratoons.

1953. KING, N. J.

The germination of Q.50.

Cane Grs' quart. Bull., 1951, 25: 24-5.

Enquiries into many reports from South Queensland during 1950 of poor germination of Q.50, normally a very reliable striker, have shown that the planting material used was not responsible. The most probable cause was the relatively wet, cold spring, but it is also possible that Q.50 may take some time to become fully acclimatized to conditions in South Queensland.

1954. ROUILLARD, G.

Travaux réalisés en 1950 par le Centre Agronomique du Nord. (Experiments carried out in 1950 by the Centre Agronomique du Nord, Mauritius.)

Rev. agric. Maurice, 1951, 30: 141-52+ tables and graphs.

Fertilizer trials—Nitrogen. Trials involving the application of 30, 40 and 50 kg. N per arpent were carried out in areas with different rainfalls. In 27 trials on ratoons in areas with rainfalls of 55 to 70 in. the yield of cane increased with larger applications of N, but the yield of sugar declined when N exceeded 40 kg. per arpent. In 9 trials carried out on irrigated ratoons yields of cane and sugar both continued to rise slightly as N was increased to 50 kg. In 5 trials in a dry area with a rainfall of about 45 in., N was applied at 20, 30 and 40 kg. per arpent, and here the yield of sugar declined as N exceeded 30 kg. Taking the relatively lower yields obtained in the dry area into account it is suggested that the nitrogenous manuring of ratoons should be based on a basic dressing of 10 kg. N per arpent+1 kg. N per ton of cane reaped. In 3 trials,

with plant canes in a wet region receiving 30 and 60 kg. per arpent, the higher dose increased the yield of cane slightly but depressed the yield of sugar markedly. In 4 trials with plant canes reaped in the "little season" no appreciable improvement occurred when more than 20 kg. N were applied. *Leaf analyses.* Nearly 6,000 analyses over 2 years have shown marked variations in P and K from field to field. The optimum content of P_2O_5 is 0.45 to 0.55 and of K_2O 1.5 to 1.75, but it is not recommended to reduce fertilizer applications until the contents exceed 0.6 and 2.0 respectively. It is not yet possible to interpret the results of N analyses so as to provide a basis for recommendations. *Molasses as a manure.* Previous results have been confirmed, namely that molasses has little effect when applied in conjunction with high dressings of N. Leaf analyses show that very little of the K in molasses (5% K_2O) applied in the interrows is assimilated. *Organic manures.* The results are tabulated of 14 trials in which artificial fertilizers were compared with pen manure and sludge. With the exception of one trial on eroded soil, the results support those obtained in other countries which showed that organic manures were not needed in the cultivation of cane. *Earthing up and interrow cultivation.* Earthing up has given appreciable increases in cane yields in good, cool soils, but has not given significant increases in gravelly soils. Most of the former soils, however, are either irrigated on in the wet zone, whereas the latter are in the dry zone, which makes it difficult to draw conclusions. *Interrow cultivation in 46 trials with ratoons* has reduced yields, particularly on gravelly soils in the dry region. *Setts from plant canes and ratoons.* Two preliminary experiments showed no differences in germination or growth between setts taken from plant canes and ratoons. *Varieties.* Notes are given on the performance of M.134/32, M.423/41 and M.112/34.

1955. HALAIS, P.

Méthodes améliorées de dosage de N, P et K par colorimétrie et néphélométrie photo-électrique pour le diagnostic foliaire de la canne à sucre. (Improved methods of determining N, P and K by photoelectric colorimetry and nephelometry for the foliar diagnosis of sugar cane.)

Rev. agric. Maurice, 1951, 30: 222-8, bibl. 5.

The methods used for determining N, P and K in the foliar diagnosis of sugar cane in Mauritius are described in detail, that for K having been recently simplified.

1956. DU TOIT, J. L.

Potash: a neglected fertilizer?

Proc. 25th annu. Congr. S. Afr. Sugar Tech.

Ass., 1951, pp. 91-8, bibl. 24, reprinted in *S. Afr. Sugar J.*, 1951, 35: 377-87.

South African soils are notoriously deficient in phosphates and the value of P and N fertilizers has been recognized for many years. As long ago as 1912 a fertilizer trial on sugar cane showed a response to K as well as P, but subsequent trials for the most part showed only slight or negligible responses to K. In consequence very little K has been applied to cane, and to-day K deficiency symptoms, which are described, are becoming commoner and leaf analyses and growth measurements have shown that K deficient areas do

exist. During 1948 an NPK experiment, with K applied in different forms and at different rates, was laid down at Mtunzini on Co.301 cane which was stunted and showed K deficiency symptoms. All the K treatments significantly increased the yields of both cane and sucrose as compared with N and NP treatments, though there were no differences between the individual K treatments. K also significantly increased the sucrose per cent. cane and improved juice quality appreciably. Leaf analyses as well as juice and bagasse analyses for K correlated well with the final yield. In a further small trial setts from the K plots showed 90% germination compared with 64% for setts from the no-K plots.

1957. PEARSON, C. H. O.

Suggestions as to the use of pipes in the distribution of irrigation water and the comparison of cost between the construction of furrows and the laying of pipes.

Proc. 25th annu. Congr. S. Afr. Sugar Tech. Ass., 1951, pp. 79-83.

Costs are compared for the distribution of water to Natal cane fields by concrete and wire and cement furrows on the one hand and a system of underground pipes on the other. Over a 50-year period the pipes would show a slight saving in cost and in addition would effect a saving in water. Piping would also make it possible to irrigate by sprinkler, which has definite advantages over furrow irrigation, especially when the cane is small.

1958. BARNES, A. C.

Field drainage for sugar cane lands. An important aspect of cultivation.

S. Afr. Sugar J., 1951, 35: 389-93, illus.

The basic principle of field drainage is to assist the land to get rid of surplus water in the upper layers of the soil so as to maintain conditions providing for aeration, warmth, and adequate moisture within the root zone of the crop. Field drainage systems comprise subterranean and surface methods of several types, each adapted to local conditions. Subterranean or underground drainage includes mole, tile, and stove drains designed and constructed to last over a long period. Two systems of surface drainage, cambered beds, used extensively in the British West Indies, and Louisiana banks, are described and schematically illustrated.

1959. PEARSON, C. H. O.

Mole drains and their uses; their practicability in the sugar belt.

S. Afr. Sugar J., 1951, 35: 625-9, illus.

The practical aspects of mole drainage in clay lands are considered, and an experiment carried out at the Mount Edgecombe Experiment Station is described.

1960. ANON.

Field mechanisation in the sugar industry.

S. Afr. Sugar J., 1951, 35: 691-3, illus.

"The Mechanisation Committee of the South African Sugar Association has established a permanent Agricultural Mechanisation Depot at Umhlali under the direction of Mr. B. H. Abrahamson, Field Operator to the Committee. The purpose behind the establishment of the depot is to have a settled headquarters from which the research and experimental work concerned with mechanisation can be carried out."

1961. STORY, C. G.

Rolleston cane harvesting machine.

Cane Grs' quart. Bull., 1951, 15: 15-18, illus.

The Rolleston cane harvester introduced in 1950 is described and illustrated. Its good features include the ground cutting and topping mechanisms mounted in front of a tractor with automatic delivery of the bundles to one side, ability to start on any row without the need to clear a passage, the use of only one man for all operations, ability to work under wet conditions and in heavy crops, mobility, and the limited number of moving parts likely to need maintenance. The price is expected to be within the means of the smaller grower.

1962. BALCH, R. T., BROEG, C. B., AND LAURITZEN, J. I.

Effect of burning on the deterioration of sugarcane under Louisiana conditions.

Tech. Bull. U.S. Dep. Agric. 1021, 1950, pp. 22, bibl. 17.

In Louisiana the removal of trash by hand has been largely replaced by a burning operation after the cane has been cut by machine at top and bottom and placed across adjacent ridges in heaps. The authors review the literature on the effects of burning on the deterioration of cane when, as often happens in practice, milling is delayed, and then describe 5 experiments designed to supply more basic information on the subject. In each case a similar system of sampling was used. In one trial both burnt and unburnt cane was stored in the open on racks, half of each type of cane being sprinkled with water three times a day and the remainder being left as dry as the weather would permit. In the other trials the cane was stored under controlled conditions of temperature and humidity. Changes in weight and chemical composition were recorded in most cases after 3, 6 and 10 days' storage. The results showed a number of inconsistencies and possible explanations of these are discussed. However, despite these inconsistencies, certain effects of burning the trash and of prolonged storage were clearly established. The 4 controlled experiments showed that burning had no effect on the rate at which the cut cane lost weight through the evaporation of moisture under drying conditions, at least in closed rooms and at temperatures ranging from 55° to 85° F. With one unexplained exception adjusting conditions in the rooms to give the same saturation deficit resulted in approximately the same loss of moisture at different temperatures. With unburnt cane moisture loss was the main factor affecting the rate and degree of sucrose hydrolysis. For all practical purposes there was a gain in reducing sugars equal to the loss of sucrose. In general there were no significant changes in pH or acidity apart from those caused by loss of moisture. With burnt cane the growth of micro-organisms was apparently checked at low humidities for the first few days and this resulted in slower deterioration than in unburnt cane. Thereafter, however, the injured stalks of burnt cane were readily invaded by micro-organisms and deterioration was generally more rapid than in unburnt cane, particularly after 1 week and when conditions were dry. Depending on the activity of the micro-organisms the pattern of deterioration in burnt

cane stored for about 1 week varied from apparently normal hydrolysis of sucrose to a condition in which non-sugars developed rapidly at the expense of sugars. There was some evidence that resistance to deterioration increased in both burnt and unburnt cane as the season advanced, but this factor needs further investigation. Similarly no true comparison could be made between the 3 varieties used. The general conclusion to be drawn from the trials is that much of the difference often found between actual factory recovery of sugar and theoretical recovery, based on the analysis of fresh, clean cane, could be accounted for by delays in the milling of harvested cane.

1963. KING, N. C.

Methods and results of sugarcane mosaic resistance and tolerance tests.

Proc. 25th annu. Congr. S. Afr. Sugar Tech. Ass., 1951, pp. 99-101, reprinted in *S. Afr. Sugar J.*, 1951, 35: 443-5.

A method used in preliminary trials to test cane varieties for their reaction to mosaic, which shows promise of being quantitative as well as partially qualitative, is outlined. The methods used in a tolerance trial with 4 varieties and the results obtained are also described. N:Co.291 and Co.281 proved to be very susceptible, but tolerant. Co.301 and N:Co.310 were susceptible and not tolerant, but tended to recover. In conclusion it is pointed out that up to the present there has been no evidence that different strains of mosaic exist in Natal.

1964. ARRUDA, S. C., AND TOFFANO, W. B.

O carvão da cana no estado de São Paulo.

(Sugar cane smut in the State of São Paulo.)

Biológico, 1951, 17: 155-65, bibl. 3, illus.

Sugar cane smut, *Ustilago scitaminea*, first appeared in the State of São Paulo, Brazil, in 1946. The measures that are being taken to prevent its spread are described. These include the eradication of centres of infection and the substitution of susceptible varieties, such as P.O.J.36 and P.O.J.213, by resistant ones, such as Co.290, P.O.J.2727 and P.O.J.2878. Other preventive measures recommended are propagation only from healthy plant cane crops, regular inspection of nursery material and rotation of varieties.

1965. REYES, G. M.

A report on an unusual outbreak of the yellow spot disease of sugarcane in the Philippines.

Philipp. J. Agric., 1950 (published 1951), 15: 1-7, bibl. 1, illus.

The yellow spot disease of sugar cane, caused by *Cercospora kopkei* Krüger, is generally of slight importance, but towards the end of 1949 a comparatively severe outbreak occurred in Victorias, Occidental Negros. The disease is here described and factors affecting its spread and its effect on yield are discussed. No variety was found to be immune but some appeared to be much more resistant than others. For control it is suggested that the trash in infected fields should be burnt after harvest, the ratooning of infected fields should be avoided where possible, and replanting be limited to the more resistant varieties.

1966. BUZACOTT, J. H.

Note on varietal susceptibility to yellow spot.

Cane Grs' quart. Bull., 1951, 25: 23-4, illus.

The development during 1950 of considerable yellow spot infection on the Meringa Sugar Experiment Station has made it possible to draw up a provisional classification of susceptibility for 37 out of the 40 approved cane varieties in Queensland.

1967. WILSON, G.

Frenchi cane grub: control of the third stage

in plant cane by means of B.H.C.

Cane Grs' quart. Bull., 1951, 25: 25-8, illus.

The method of applying BHC in the half open drills when newly planted cane has become established will control both greyback grubs and the younger stages of the frenchi grub, but does not operate early enough to prevent severe damage by third stage frenchi larvae. The results of preliminary trials suggest that the third stage larvae can be controlled by applying BHC to the freshly planted rows after the setts have been lightly covered with soil, the BHC then in turn being covered to a depth of 2 to 4 in. For commercial control a 10% BHC-pyrophylite dust (1.3% γ -BHC) applied at 150 lb. per acre proved adequate.

1968. WILSON, G.

The effect of mixing fertilizer with benzene hexachloride for cane grub control.

Cane Grs' quart. Bull., 1951, 15: 18-21, illus.

In trials in 1950 the inclusion of BHC at 3 concentrations with the fertilizer applied to cane gave a lower vegetative index, based on the weight of 30 leaves of equal rank at 5 to 7 months, and a smaller number of cane stalks per acre than did fertilizer alone or fertilizer with BHC applied separately after planting, although the mixture gave better results than BHC applied alone without fertilizer. Earlier results had shown that mixing BHC with fertilizer did not reduce its effectiveness against greyback grubs, provided it was not applied too deep. Other trials showed that BHC alone did no damage to the cane provided this was first lightly covered with earth, but that direct contact with cane setts in the drills harmed germination. It is therefore recommended that, pending the results of further studies, BHC should not be mixed with fertilizer nor placed in exactly the same position as fertilizer in the soil.

1969. MUNGOMERY, R. W.

Warfarin—a new rat poison.

Cane Grs' quart. Bull., 1951, 15: 13-14, illus.

Reasons are advanced why it is thought unlikely that Warfarin will be of much value against rats in cane fields.

Tea.

(See also 1891d, 2024.)

1970. ANON.

Progress in tea trials.

Qd agric. J., 1951, 73: 96.

Experiments showed that good quality teas can be produced on the lowlands of the northern Queensland

coast. Mechanical tea cropping trials showed promising results. C.W.S.H.

1971. VARELA MARTINEZ, R.

El té negro una industria agrícola de Colombia. (Black tea, an agricultural industry in Colombia.)

Agric. trop. Bogotá, 1951, 7: 11: 33-6, bibl. in text.

Tea seed was introduced to Colombia from China in 1930. Tea is now being grown on a commercial scale in the Departments of Cundinamarca and Valle del Cauca, and in 1950 11,000 kg. were produced. Steps are being taken to protect home production against imports.

1972. SCHWEIZER, J.

Aanbevolen theeplantmateriaal 1951/52.

(Recommended tea planting material, 1951-52.)

Bergcultures, 1951, 20: 399-405.

Work on the seedling and clonal selection of tea in Indonesia is summarized and the clonal material recommended by the C.P.V. Research Station is listed. These recommendations are only provisional as the clones have not been fully tested for resistance to blister blight. A note is given on the apparent advantages of propagating tea by cuttings rather than by grafting.

1973. BISSON, R.

Influence de la fumure et de la taille de formation sur la production du théier.

(The effect of manuring and formation pruning on the production of tea.)

Agron. trop., 1951, 6: 115-45.

Three field trials carried out over the period 1935 to 1942 at the Experimental Station at Blao in southern Viet-Nam are described in full detail with statistical analyses. The soils used were relatively high in organic matter and N, high in total P_2O_5 but low in available P_2O_5 and in K_2O ; the pH ranged from 4.27 to 6.36. The climate at the station is equable. 1. *Artificial and organic fertilizers.* The variety was Manipur planted in 1934 and the fertilizers complete NPK, N (sulphate of ammonia), NK (sulphate of potash), N+fish manure, and nil. Yields of leaf were recorded over 6 years from 1936-37 onwards. Both NPK and more especially NK gave significant increases in the mean yield over the control, whereas neither of the other treatments, both involving N, had an appreciable effect. 2. *A comparison of organic manures.* Fish manure and coconut, groundnut and rubber meals were compared over 6 years with artificial NPK. Coconut meal gave significantly higher mean yields than fish manure or rubber meal, and groundnut meal and artificial NPK proved significantly better than fish manure. Allowing for costs the artificial NPK was the most satisfactory. 3. *Formation pruning.* Results recorded over 3 years with several varieties are given for 3 methods of formation pruning. (a) Pruning at 2 years, the bushes being centred 2 years after planting in some cases to 20-25 cm., in others to 8-10 cm., plucking being done lightly in the year of pruning and normally the year after. (b) Pruning at 1 year after planting to 20-25 cm., leaving all branches to develop and cutting back to 5-10 cm. above the original plucking table the year

after. (c) The Horsfall method in which the branches were tipped back every six months, the plucking table being raised about 10 cm. on each occasion. The standard method of pruning at 2 years gave the highest yields of leaf with all the varieties.

1974. DE JONG, P.

Power dusting against blister blight.

World Crops, 1951, 3: 106, illus.

Applying the power dusting technique used successfully to control the tea mosquito, preliminary trials were carried out against blister blight in Southern India using dusts of minimum copper content and high adhesive qualities. The results obtained have been sufficiently encouraging, both as regards control and the avoidance of toxic concentrations of copper in tea in bearing, to warrant further investigations.

1975. EGOROV, I. A.

The vitamins in tea. [Russian.]

Priroda, 1951, 40: 7: 56-7, bibl. 5.

A brief account of the general properties of tea infusions is followed by a review of investigations of the vitamin content of tea leaves with particular reference to vitamin C and the vitamins of the B group.

1976. SPOON, W.

Theekisten bekleed met Saran. (Tea chests lined with Saran.) [English summary 23 lines.]

Plastica, 1951, 4: 236, reprinted as *Ber. Afd. trop. Prod. Dep. roy. trop. Inst. Amsterdam* 233, pp. 5, bibl. 5.

Three plastics, i.e. Pliofilm, polyethylene and Saran, have now been examined as linings for tea chests. All three give the tea a protection against moisture equal to that of the normally used aluminium. Packing in Pliofilm has no effect on flavour and taste, while packing in polyethylene and Saran seems to have a slight influence on both. [From author's summary.]

Other crops.

1977. CÁRDENAS, M.

Plantas alimenticias nativas de los Andes de Bolivia. (Native food plants of the Bolivian Andes.)

Reprinted from *Folia Universitaria Cochabamba* 2, 3 and 4, 1950, pp. 25, illus.

Notes are given on the importance, botany and vernacular names of some native Bolivian plants grown for food. They are grouped under Roots and tubers, Cereals and other seed crops, and Fruits, the last group comprising plants of the families Curcubitaceae, Solanaceae, Passifloraceae, Annonaceae and Cactaceae.

1978. SINGH, M. P.

Preliminary growth rate studies of chikoo fruit.

Indian J. Hort., 1951, 8: 3: 17-21, bibl. 1.

Thirty fruits of the chikoo [sapodilla], *Achras zapota*, were measured weekly at Nagpur where these fruit take nearly 10 months to reach maturity and are then relatively small in size. Measurements of length and breadth were made over a period of 29 weeks until the fruits reached maturity. During the first 16 weeks the diameters of the fruits exceeded their length, then for 4 weeks diameter and length were similar, and thereafter length exceeded diameter. The second stage,

when length and breadth were equal, coincided with a reduction in the rate of growth in diameter to a point lower than that recorded at any other stage, and it is suggested that this transition phase is a critical period in the growth of the fruit. The measurements also showed that fruits that were comparatively large at the outset, and were therefore presumed to have set relatively early, developed into larger fruits than did fruits that were comparatively small at the outset.

1979. AKAMINE, E. K.

Germination of seed of Koa Haole (*Leucaena glauca* (L.) Benth.).

Pacific Sci., 1952, 6: 51-2.

In a previous article [*Circ. Hawaii agric. Exp. Stat.* 21; *H.A.*, 14: 333] the author described methods of facilitating germination in *Leucaena glauca*. Further observations show that the time needed for maximum germination of untreated seeds under optimum conditions in the soil may vary from 1 to 4 or more years depending on the amount of hard seed. Prolonged storage tends to extend the dormant period. He finds that the seeds will remain viable under ordinary storage conditions for as long as 10 years.

1980. ANON.

Nuevas introducciones de plantas útiles a Costa Rica. I. Pulasan (*Nephelium mutabile* Blume). (New introductions of useful plants to Costa Rica. I. The pulasan.) *Suelo Tico*, 1951, 5: 117-18, illus.

The pulasan, a close relative of the rambutan, is suggested as a useful new plant for garden culture in certain districts of Costa Rica. It should be grown at altitudes below 800 m. in areas with no marked dry season. Round Turrialba the tree fruits from May to the beginning of July. In the Far East it is generally propagated vegetatively. Trials carried out at the Interamerican Institute of Agricultural Sciences, Turrialba, on propagation by seed showed that seed sown on the day it was harvested had 100% germination, but that this decreased to 53% after 6 days and to 0% after 22 days.

Noted.

1981.

a ABRAHAMSON, B. H.

A new cane planter; the Mawba machine described.

S. Afr. Sugar J., 1951, 35: 637-9, illus.

b ANON.

Australia's sugar industry; a brief review of the development.

Bank of New South Wales Review, abstr. in *S. Afr. Sugar J.*, 1951, 35: 527-9.

c ANON.

Australia has four mechanical cane harvesters.

World Crops, 1951, 3: 78-9, illus.

Notes on the Kinnear, Toft, Fairymead and Moloney harvesters.

d ANON.

The tea industry. A review of world production.

World Crops, 1951, 3: 292-6, bibl. 4, illus.

- e ANON.
Protodiaspis cinchonae McKenzie, una nueva especie de Diaspididae para Bolivia. (*Protodiaspis cinchonae*, a new species of Diaspididae in Bolivia.)
Rev. Agric. Cochabamba, 1951, 7: 6: 35-6.
As a pest of cinchona causing leaf galls.
- f ANON.
Les conditions de la culture bananière au Cameroun. (Conditions of banana cultivation in the Cameroons.)
Marchés colon. Monde, 1951, 7: 1979-80, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 563.
- g ANON.
Efectos de la sombra y de otros factores en el transplante de cafetos del almacigal al criadero. (The effects of shade and other factors on coffee transplanted from the seedbed to the nursery.)
Rev. interamer. Cien. agric., Turrialba, 1951, 1: 3: 140-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 435.
- h BARNES, A. C.
Sugar research in the West Indies.
Proc. 25th annu. Congr. S. Afr. Sugar Tech. Ass., 1951, pp. 86-90.
A review of progress.
- i BARNES, A. C.
The Natal sugar industry.
World Crops, 1951, 3: 375-8, illus.
- j BARTOLOME, R.
The propagation of cacao by softwood cuttings in Central and tropical South America.
Philipp. J. Agric., 1950 (published 1951), 15: 23-9, bibl. 16, illus.
A review of methods used in Trinidad, Costa Rica and Ecuador.
- k COOLHAAS, C.
Indrukken van de koffiecultuur in Brazilië. (Impressions of coffee growing in Brazil.)
Bergcultures, 1951, 20: 311-19, illus.
- l CORRÊA, A. C.
Café e esterco de galinha. (Coffee and poultry manure.)
Reprinted from *J. Notícias S. Paulo* in *Bol. Super. Serv. Café, S. Paulo*, 1951, 26: 859-62.
- m CULLÉ, J.
Récentes améliorations des procédés de lutte utilisables contre le charançon du bananier. (Recent improvements in the control of the banana borer [*Cosmopolites sordidus*].)
Fruits d'Outre Mer, 1951, 6: 280-4, illus.
- n DEULLIN, R.
À propos du transport des bananes. (The shipment of bananas.)
Fruits d'Outre Mer, 1951, 6: 336-7.
A note on problems being studied by the I.F.A.C.
- o DEVE, F.
Quelques conditions essentielles à respecter dans l'équipement des navires destinés à assurer le transport des bananes emballées. (Some essential conditions in the equipment of ships used for carrying packed bananas.)
Fruits d'Outre Mer, 1951, 6: 381-4.
- p DODDS, H. H.
The world's sugar industries; their scientific and technical progress.
S. Afr. Sugar J., 1951, 35: 705-19.
- q DODDS, H. H.
Notes on the development of the sugar industries of Queensland and Natal in recent years.
Proc. 25th annu. Congr. S. Afr. Sugar Tech. Ass., 1951, pp. 31-8.
- r FIESTER, D. R.
Un propagador de alta humedad para enraizamiento de estacas. (A high humidity propagator for rooting cuttings.)
Rev. interamer. Cien. agric. Turrialba, 1951, 1: 3: 146-9, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 429.
- s DE GEUS, J. G.
Koffie; cultuur-eisen en bestrijding van ziekten en plagen. (Coffee; cultural requirements and control of pests and diseases.)
Plant en Bodem, 1951, 8: 3-51, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 494.
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Water conservation in coconut and rubber crops.
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- u HALAIS, P.
Les bases théoriques du mode de paiement des cannes pratiqué au Queensland. (The theoretical bases of the method of cane payment adopted in Queensland.)
Rev. agric. Maurice, 1951, 30: 132-40, bibl. 3.
For another account, see *H.A.*, 21: 1168.
- v JOLY, R. L.
Ressources agricoles et production bananière du Cameroun. (Agricultural resources and banana production in the Cameroons.)
Cahiers Colon., 1951, 34: 121-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 362.
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The increasing importance of new cane varieties to our industry [in Queensland].
Cane Grs' quart. Bull., 1951, 25: 28-9.
- x LIYANAGE, D. V.
First or second bunch nuts?
Ceylon Coconut Quart., 1950, 1: 3: 11-12 [received 1952].
Coconuts for seed. For a fuller account, see *H.A.*, 21: 3991.

- y LOCSIN, C. L.
Latest information regarding H 37-1933 and POJ 3016 for the Victorias Central Planters. *Sugar News*, 1951, 27: 145-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 464. Production figures from the Victorias Central Planters Research Station, Philip-pines.
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Cane varieties in Rhodesia. *S. Afr. Sugar J.*, 1951, 35: 505.
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- a MARTIN, F.
Bouturage du cacaoyer et du caféier. (Propagation of cacao and coffee by cuttings.) *Rev. int. Prod. colon.*, 1951, 26: 260: 108-10, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 495.
In Trinidad and Brazil.
- b MARTIN, J. P.
Germination of sugar cane cuttings. *Sugar News*, 1951, 27: 159-62, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 464.
- c MOITY, M.
L'évolution de la culture du bananier en Guinée et les problèmes qu'elle pose. (The evolution of banana growing in French Guinea and the problems associated with it.) *Fruits d'Outre Mer*, 1951, 6: 197-9.
Including soils, manuring and pest control.
- d PY, C.
L'ananas à Porto-Rico. (The pineapple in Puerto Rico.) *Fruits d'Outre Mer*, 1951, 6: 359-68, illus.
A concise report on all aspects of culture.
- e ROSS, S. D., AND BROATCH, J. D.
A review of the swollen shoot control campaign in the Gold Coast. *Rep. Cocoa Conf. Lond.*, 1951, Cocoa, Choc. & Confect. Alliance Ltd., 1951, pp. 92-100.
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Le cacao dans l'économie rurale du Woleu-N'Tem. (Cacao in the rural economy of Woleu-N'Tem [French Equatorial Africa].) *Bull. Inst. Ét. Centrafr.*, 1950, 1: 7-24, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 465.
- g SCHOOFs, M.
Évolution technique de la culture et de production du caoutchouc au Congo belge. (A historical account of the technical progress in the culture and production of rubber in the Belgian Congo.) *Rubber*, 1951, 7: 52-4, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 312.
- h SCHRADER, R. S.
Grass under coconuts. *Ceylon Coconut Quart.*, 1950, 1: 3: 17-20 [received 1952].
- i DE SILVA, E.
Pineapples as a catch-crop with young coconuts. *Ceylon Coconut Quart.*, 1951, 2: 23-6.
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Constituents of the leaves of *Psidium guajava*, L. Part I. Psidiolic acid. *J. chem. Soc. Lond.*, 1952, pp. 134-6, bibl. in text.
- k STANER, P., AND COLARD, E.
Les plantations indigènes d'hévéas au Congo belge. (The native hevea plantations in the Belgian Congo.) *Rubber*, 1951, 7: 55-7, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 336.
- l THUREAU-DANGIN, L.
La culture du caféier en Côte-d'Ivoire. (Coffee growing on the Ivory Coast.) *Rev. int. Prod. colon.*, 1951, 26: 260: 115-17, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 494.
- m TURNER, P. E.
Some methods of sugarcane agriculture in the British West Indies. *Rev. agric. Maurice*, 1951, 30: 125-31.
With particular reference to soil manage-ment.
- n VOLP, P.
An outline of disease control [in sugar cane] in the Mulgrave area. *Cane Grs' quart. Bull.*, 1951, 25: 30-2.
- o WILLIAMS, J. F.
Development of the cane sugar industry in British Guiana. *Mon. Inform. Bull. Caribb. Comm.*, 1951, 4: 674-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, 6: 464.
With reference to methods of cultivation.

NOTES ON BOOKS AND REPORTS.

Books.

1983. BARNES, H. F.
Gall midges of economic importance. Volume V. Gall midges of trees.
Crosby Lockwood & Son, London, 1951, 8½ × 6 in., pp. 270, bibl. 450, 15s.
Volume V* of this important series of publications entitled "Gall Midges of Trees" provides a welcome

* Issued after Vol. VI, for which see *H.A.*, 19: 3519.

addition to the five previous volumes, since it treats of all the gall midges of conifers and broad-leaved trees. And as Dr. R. N. Chrystal points out in his Foreword, it appears at an opportune moment in the history of our forestry development in Britain; namely the eve of important changes in policy, especially in the matter of education and research. The pattern of the book is similar to that of previous volumes and the different species of gall midges are discussed under their respective host plants. The

work is divided into two sections, the first dealing with the gall midges of conifers, and the second with those of broad-leaved trees.

No less than eighty species of gall midge are associated with conifers, a large number of them occurring in Europe. They infest the buds, fruits, terminal shoots, seeds and the cones, while some even live under the bark. The pine-needle gall midge, *Thecodiplosis brackyntera* Schwäg., a well-known pest of young pines on the Continent, has appeared in young plantations in this country in recent years, and may well be a source of worry to the forester in years to come. The first section will prove of great value to the forester, since all the species associated with forestry are referred to in detail, and adequate references are included for the benefit of the research student.

The greater part of the book relates to the gall midges of broad-leaved trees (Section II), and over two hundred species are discussed under their thirty-eight host plants. For example, sixteen species of midge are associated with ash, thirteen occur on beech in different parts of the world, and of the midges which infest willow, three are regarded as of economic importance in view of the injury caused in cricket bat willow nurseries in England and elsewhere.

Very little work has been carried out on the control of midges of conifers and broad-leaved trees, and it is significant that the measures advocated are the time-honoured ones of "hand picking" and the "cutting off and destroying of the galls". Can we hope that this book may stimulate some student of the group to study some of the conifer species, with a view to their control in the nursery beds and plantations?

The indexes are very complete. One of them lists the generic, specific and popular names of the midge, and there is also a plant index and general index.

The book, being well written and produced in a style that makes for easy reading, may be regarded as indispensable to the entomologist and those interested in all aspects of forestry and park lands. A.M.M.

1984. BEAN, W. J.

Trees and shrubs hardy in the British Isles.

John Murray, London, 1951, 7th edit., 8½ × 5½ in., Vols. 2 and 3, pp. 636 and 664, illus., 42s. vol.

With the publication of these two volumes (Vol. 1 was issued in 1951, *H.A.*, 21: 2114) the 7th and revised edition of Bean's *Trees and Shrubs* is now complete. The present edition has been brought fully up to date with the inclusion of the new introductions and some interspecific hybrids of recent years, which, though less numerous than those of the non-woody plants, are still considerable. The scope of the book, too, has been usefully enlarged by bringing in those trees, shrubs and woody climbers which, though not hardy in most parts of Britain, have proved to be at least temporarily tolerant in the mildest parts of the country. The arrangement is alphabetically by genera and species, Vol. 1 ending with the letter E and containing the historical notes and chapters on cultivation. The remaining volumes contain descriptions only and are illustrated, as is the first, by a number of very beautiful plates and many, though not enough, line drawings. The photographs are of particular interest because of

the little-known plants portrayed. As an example of the thoroughness with which the work has been done it may be noted that of the genus *Rhododendron* 300 species and a number of subspecies are here described, of *Rosa* 91, *Salix* 54, while of *Viburnum* 48 species are fully discussed. In the case of some of the rarer plants mentioned in the work the gardens in which well-grown specimens are harboured are often named and can presumably be visited. Since its first publication in 1914 this book has been the standard authority on trees and shrubs hardy in these Islands, and further praise or recommendation would seem superfluous. G.St.C.F.

1985. COWIE, G. A.

Potash, its production and place in crop nutrition.

Edward Arnold, London, 1951, 8½ × 5½ in., pp. 172, bibls., illus., 21s.

This is an up-to-date account of the present position of potassic fertilizers, indicating normal sources, the manufacturing processes, potential other sources, their total production and consumption, their relation to soil and crop, how deficiencies appear and are diagnosed, and finally the fertilizer requirements of individual temperate and tropical crops.

Chapter and verse are given for the results of experiments which are very largely concerned with horticultural and plantation crops. Many of the points made are strikingly brought out by excellent illustrations and the reader may be assured that the book is not an advertising stunt to sell potash, but a serious, very useful contribution to the subject of the part played by N, P and K in the nutrition of horticultural crops as shown by recent experimental work. Among crops considered are hops, apples, bananas, citrus, cloves, cocoa, coconuts, mangoes, pineapples, vines, strawberries, raspberries, oil palms, rubber, sugar cane, tea, tobacco, and several vegetables. D.A.

1986. BUTLER, C. G.

The honeybee. An introduction to her sense-physiology and behaviour.

Geoffrey Cumberlege, Oxford University Press, London, 1949, 7½ × 5 in., pp. 135, bibls., illus., 10s. 6d.

VON FRISCH, K.

Bees. Their vision, chemical senses, and language.

Cornell Univ. Press, Ithaca, N. York; Geoffrey Cumberlege, Oxford University Press, London, 1950, 9 × 5½ in., pp. 119, illus., \$3 or 18s.

Commercial horticulturists, whose fortunes may be said to depend in no small measure on pollination, may from time to time like to step aside from the filling up of forms and even from considering whether they have planted sufficient cross-pollinating varieties of fruit trees to study more closely the remarkable habits, gifts and reasoning of their great ally, the honeybee. We therefore bring to the attention of our readers two books recently published by leading authorities on those subjects.

Neither the head of the bee research department at Rothamsted nor Karl von Frisch, Professor of Zoology in the University of Munich, make any pretence that these books are manuals of beekeeping. But to the

man who is a keen beekeeper, or to the fruitgrower who wants to delve beneath the surface, they offer entirely fascinating studies of this most intelligent of useful insects. After an introduction on social life and division of labour among bees Butler considers their many senses, including their perception of colour, form, hearing and senses of time, smell and taste. He then turns to their methods of collection and utilization of propolis, water, pollen and nectar, and finally studies their behaviour in the field.

von Frisch deals in turn with the colour senses, the chemical senses and finally the "language" of bees. The language consists of a dance made by a bee returning to the hive who has found a new source of food. In this dance, as von Frisch's experiments, here described, demonstrate, she indicates not only the direction of the food but, by the scent of the food, what this food is. If this sounds too fantastic, read and be convinced, but in any case read. D.A.

1987. EDMOND, J. B., MUSSER, A. M., AND ANDREWS, F. S.

Fundamentals of horticulture.

The Blakiston Company, N. York, Philadelphia, Toronto, 1951, $9\frac{1}{2} \times 6$ in., pp. 502, bibls., illus., \$5.50.

Fundamentals of Horticulture is intended as a beginners' textbook for American college courses in general horticulture given on a semester or quarter (i.e. 4 or 2 month) basis. The text is divided into 3 parts: an account of the fundamental plant processes and of factors affecting plant growth, an account of the principal horticultural practices showing how they affect these fundamental processes, and an account of the chief horticultural crops. This last part also contains chapters on Commercial floriculture, Nursery plants and Horticulture and the home. This is a wide syllabus to be condensed into such a short course and the treatment is necessarily summary. The authors, however, have achieved their aim of presenting a well-balanced view of horticulture as a whole by laying the emphasis throughout on the basic principles of plant growth, such as photosynthesis, respiration and movement of carbohydrates, and by limiting the treatment of horticultural practice to a review of general trends.

The book has thus the same laudable purpose as V. R. Gardner's *Basic Horticulture* [see *H.A.*, 21: 4090], to train the student to think for himself. By devoting over a quarter of the book to individual crops, however, less space is available for study of general principles, with the result that the standard is more elementary and omissions are inevitable. A surprising omission, however, is that of the function of auxins in the plant and of their many practical applications in horticulture. Very brief mention is made of their use in propagation and weed control but none of their value for blossom thinning, controlling fruit drop, inducing fruit set or prolonging dormancy of potato tubers. The frequent use made of recent experimental results to illustrate the importance of horticultural practices should serve to rouse the student's interest and incite him to delve deeper into the subject than is here possible. The student might have derived even more benefit from this stimulus had the bibliographies at the end of each section been selected with a view to directing his further reading rather than to listing the publications, nearly

half of them pre-war, which the authors had found particularly helpful in writing the section. The illustrations are well chosen and do much to supplement the necessarily concise text. P.R.-D.

1988. ELLIOTT, C.

Manual of bacterial plant pathogens.

Chronica Botanica Co., Waltham, Mass., U.S.A., Wm. Dawson & Sons Ltd., London, 1951, $10\frac{1}{2} \times 7$ in., pp. 186, figs. 6, \$6.00.

The earlier edition of Dr. Elliott's Manual was published in 1930 and proved invaluable to plant pathologists, particularly those actually engaged in the investigation of plant bacterial pathogens. This "second, entirely revised edition", bringing the information up to date after 21 years during which much work has been carried out in this field, will be greatly welcomed. It consists of Part I, Bacterial plant pathogens of the genera *Atrobacterium*, *Bacterium*, *Corynebacterium*, *Erwinia*, *Pseudomonas*, *Xanthomonas*; Part II, Bacterial species reported in the literature from plants but not recognized as valid plant pathogens; Index of genera and species of plant hosts; Index of genera and species of bacteria. A bibliography and a detailed description of each organism are clearly set out. A copy of this new edition should be in the library of every plant pathology institute. H.W.

1989. FARM MECHANIZATION.

Farm Mechanization Directory 1952.

Temple Press Ltd., Bowling Green Lane, London, E.C.1, 1951, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 504, illus., 6s.

This book contains a list of organizations in the U.K. interested in farm mechanization, an index of manufacturers' names and addresses in the U.K. and classified directories (1) of tractors, (2) of other farm implements. Enough detail is given to indicate the capacity of the goods offered. To the agriculturist wanting machinery and uncertain of source it usefully points the way, whether he wants bird scarers, hop picking machines, or wheelbarrows.

1990. FRANKLIN, M. T.

The cyst-forming species of Heterodera.

Tech. Commun. Bur. agric. Parasit. St. Albans, 1951, pp. 147, bibl. 646, illus., 18s. 6d.

Life cycles, plants attacked and control methods are considered for the following *Heterodera* of horticultural importance: *H. schachtii* and its varieties and races, *H. cacti*, *H. göltingiana*, *H. cruciferae*, *H. humuli*, and *H. rostochiensis*.

1991. GOT, N.

Le pêcheur. (The peach.)

Norbert Got, 82, Av. Général de Gaulle, Perpignan, 1950, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 215, bibl. 84+8 in text [received 1952], Frs. 650.

This unassuming, paper-backed book, without even an illustration to catch the public's eye, is in fact an admirable account of modern methods of peach growing, giving up-to-date information on almost all the problems the grower is likely to meet. With a view to extending the knowledge of the French grower beyond the confines of local tradition, the author has assembled his own wide experience of peach growing in France together with the findings of workers from

various parts of the world. Introductory chapters deal with the origin of the peach, history of peach growing, botanical characters and areas of production in France. These are followed by chapters on environmental requirements, propagation and rootstocks, and varieties, detailed pomological descriptions being given of the more important varieties of peach and nectarine, and brief notes on those of minor importance. There is a useful chapter, full of practical hints, on establishing an orchard, and a long account of orchard management with special attention given to pruning. Harvesting and marketing, the economics of production, utilization, and pests and diseases are all dealt with from the point of view of the French grower.

It is perhaps surprising that no reference is made to the chemical thinning of peaches, and that the use of growth substances for weed control and for inducing early ripening is dismissed in one sentence, but omissions such as these only emphasize that the book is intended for the commercial grower rather than the research worker. This is also apparent in the fact that often experimental results are quoted with no reference to the paper in which they were published. But as a guide to sound commercial practice the French peach grower should find this book invaluable. P.R.-D.

1992. HILDEBRANDT, B., AND MAURER, K. J.
Frostsicherer Obstbau. Reiche Ernten trotz harter Winter und klimatisch rauher Lagen. (Winter-hardy fruit growing [in Germany].)
 Trowitsch-Verlag, Hanover, 1948, 8×6 in., pp. 176, Dm. 4.50 [received 1952].

After recent severe winters tree damage through frost injury has become a major problem in planning fruit plantings on many sites in Germany. The congestion of the country makes it, moreover, desirable that all marginal land should be used and that fruit growing should be pushed further up the hills into rougher climates. The authors make the familiar recommendations for the prevention of winter injury, emphasizing especially the use of varieties adapted to unfavourable localities and of frost-resistant rootstocks and stem builders. A long chapter is devoted to dwarf trees which should be particularly suited to such conditions, if hardy dwarfing rootstocks could be found or bred. Suggestions for the solution of this problem are made. K. J. Maurer, who is responsible for the latest edition of the book, is well qualified by his long experience in eastern Europe and his acquaintance with the Russian horticultural literature to instruct the German grower on how to produce reasonably good fruit crops of satisfactory quality in the face of a severe climate. V.H.G.

1993. HILKENBÄUMER, F.
Grundriss des Obstbaues. (Elementary fruitgrowing.)
 Neumann, Radebeul and Berlin, 2nd edition 1951, 8×6 in., pp. 72, illus.

A short practical manual by the director of the Fruit Institute of the University of Bonn, late of Halle, dealing with the best common practice for north German conditions. His remarks on rootstocks are of interest.

Among apple stocks he recommends the use of M. I,

II, IV, IX and XII according to type of tree wanted. He notes that normally quince is too frost-susceptible for use with pears but that, where it is used, an intermediate pear, such as Gellert's or Vicar of Winkfield, must be inserted between quince and scion. He recommends that fruiting quinces should be worked on hawthorn seedlings. Plums should be worked on seedlings of Black Damas and myrobalan and on clonal white myrobalan of the Palatinate type, great greengage, Ackermann plum and German prune [Wurzelechte Hauszwetsche]. For sweet cherries only *Prunus avium* can be recommended. For other cherries on good cherry soils *P. avium* can be used, but on poor dry soils only *P. mahaleb* can be recommended, though a few can be grown successfully on sour cherry suckers. For peaches peach seedlings are generally used and on moist soils Ackermann, Brünker and Brompton plums. Apricots are worked on Hauszwetsche suckers and apricot seedlings. As useful stem builders for apples he cites Jacob Fischer and Croncels. [Incidentally he refers to the different apple stocks classified by East Malling as "Malus" I, II, etc., which would appear to offer a new source of perplexity. They undoubtedly are *Malus*, but the designation M. was originally given to them to signify their classification by Malling (or rather East Malling) workers.] D.A.

1994. JEFFERSON-BROWN, M. J.
The daffodil.
 Faber & Faber, London, 1951, 5½×9 in., pp. 264, bibl. 36, illus., 25s.

We are told in the foreword that the author is "very young". If this is so he seems to have learned a lot in the time, for his book must be as complete a guide to the daffodil world as has yet been published. He is fortunate, too, to possess the gift of clear expression and he does not allow occasional rhapsody born of an enormous enthusiasm to affect coherence. All methods of growing the daffodil are fully discussed, but to the many to whom these mysteries are already familiar the chief value of the book may lie in the accounts of the plants themselves, their origins and make up. Interest is heightened by an appendix summarizing part of the cytological work carried out on the genus during the past twenty years by Dr. A. Fernandez of Portugal, which foreshadows future drastic changes in the specific status of many *Narcissi*. Separate chapters are devoted to each of 8 classes of daffodil, trumpets, large cupped, small cupped, and other types down to the dwarfs. The latter are mostly wild species and what the author has to say about them should certainly stimulate interest in a somewhat neglected section. Although emphasis is on the better, and more expensive, garden forms [it is, by the way, not possible to agree with the blurb on the dust jacket, nor does the author claim it, that all hybrids worth considering have been mentioned], the commercial production of flowers and bulbs is given full consideration. There is a chapter on pests and diseases, their prevention and cure, including instructions on the method of using the hot water treatment for eelworm, a treatment which, it is claimed, has saved the daffodil industry from virtual extinction. An appendix contains a list of specific names and synonyms with chromosome number where determined. The book is well illustrated and there are some striking coloured plates. G.St.C.F.

1995. LONG, J., AND BONNET, P.

L'olivier à fruits de table. (Table olives.)

Minist. Agric. France, 1951, 10½ × 8½ in., pp. 63, bibl. 20, illus., obtainable from 79 rue Dragon, Marseille, Fr. 2,600.

This beautifully presented monograph on table olives, printed on vellum paper with 8 pages of coloured plates, is a delightful piece of French artistry. It is also a useful source of information for all those concerned in the table olive industry. The section on cultural technique contains notes on the most important pests and diseases with up-to-date recommendations for control, and detailed descriptions of French and foreign varieties with a critical appreciation of their qualities. There follows a section on the various methods of conservation practised in different parts of the world, and, finally, one giving data on production, imports, exports and legislation concerning table olives for the most important olive growing countries. P.R.-D.

1996. MINISTÈRE DE L'AGRICULTURE, PARIS.

La production viticole, son évolution. (Evolution in viticultural production) being *Bull. techn. Inf.* 56, 1951, pp. 184, illus., price 700 francs, from Inspection Générale de l'Agriculture, 72 rue de Varenne, Paris 7e.

In the official figures available for 1948, viticultural revenue exceeded that of all other French agricultural products except meat and milk, amounting to nearly 200 millions of francs. Yet had it not been for drought in 1949 and mildew in 1948, marketing difficulties would have already caused a financial crisis for the 1½ million Frenchmen directly concerned in vine growing. With increased competition from abroad an overhaul of the whole industry would appear to offer the only chance of successful survival. In this symposium the broad practical aspects of the problem and its component parts are weighed and examined by the leading French experts and recommendations are made for their solution.

The symposium includes 33 articles grouped under 9 heads. *Orientation.* Pleas are made for greater co-ordination of effort for the production of—not more—but better wine and for the rebuilding of vineyards on rational rather than the haphazard lines followed hitherto. *Vineyard management.* In the first article management of vineyards in Champagne is considered, in a second the greater use of mechanization in the vineyard and in a third the advantages of fallowing before replanting. *Vine production* is the heading of a section in which not only the business side of the vine nursery trade but also the latest technical production methods are discussed in 9 articles. *Manurial problems* are considered by Maume, famous for his work on leaf diagnosis of mineral requirements. Under *Plant Protection* four articles are devoted to frost protection methods, mainly by gas clouds, two to mildew prevention and cure and one to the ravages of and protection against the Roter Brenner (*Pseudopeziza tracheiphila*).

Separate articles are devoted to the *Improvement of quality* in (1) table wines, and (2) the fuller bodied white wines of Anjou. *By-products* of both vines and wines are discussed. *Winemaking* is considered firstly from the business aspect of co-operative winemaking and secondly in its technical details. *Viticultural and*

Oenological Education Associations. The advantages and prospects of forming a cadre of experts are discussed at some length. While many of the articles are of especial interest to vinegrowers or winemakers in particular districts of France, they approximate, nevertheless, in certain respects to what one would hope to find in a good modern manual of vinegrowing and should be of considerable value far beyond the boundaries of France and Algeria. D.A.

1997. PAPADAKIS, J.

Mapa ecológico de la República Argentina.

I. Texto. II. Atlas. (An ecological map of the Argentine Republic. I. Text. II. Atlas.)

Minist. Agric. Buenos Aires, 1951, pp. 158 and pp. 48, 19 maps, respectively.

Eighty-four types of climate have been distinguished in the Argentine Republic. These types are classified according to winter and summer temperatures and amount and distribution of rainfall in the first 4 maps of the Atlas. In the last 13 they are classified according to crop production, each map showing the relative suitability of the various areas of the Republic for the production of a particular field or horticultural crop. Among the crops dealt with in this way are potatoes, vegetables, vines, olives and fruit trees. In the Text, published separately, the information given in the Atlas is explained and amplified with the aid of graphs and tables, and additional information is given on the distribution of minor crops.

1998. PERRY, J. W.

Scientific Russian; a textbook for classes and for self-study.

Interscience Publishers, New York and London, 1950, 9 × 6 in., pp. 816, \$7.50.

To teach how to read Russian without direct translation into English is the aim of the author, and his method appears to be well adapted to the task and particularly suitable for those wishing to review or abstract Russian technical literature. The whole course is divided into 40 lessons, which in turn are subdivided into paragraphs, so that industrious students can sustain themselves with small but substantial doses at frequent intervals, and by the time page 676, paragraph 406 is reached, should be able to read Russian with ease. The first few lessons are written to acquaint the reader with the surprisingly large number of Russian scientific terms which correspond to well-known English terms and are easily recognized, once the alphabet has been mastered. The amount of grammar incorporated is well above the minimum required to be able to read Russian, but is of value, especially if speaking and simpler translations into Russian are considered. The index provided is similar to any other grammar index, but the short vocabularies included, Russian-English and *vice-versa*, show at a glance that they were compiled for technical people. It is rather a pity, however, from the botanist's point of view, that in a book of this nature, which should appeal to a very wide circle of scientists, the author, a chemical engineer by training, shows a strong bias for teaching the language to chemists and physicists, as is apparent from his selection of reading exercises, each of which, from lesson 7 onwards, is a coherent discussion of some such topic as "The state of matter", "Atomic energy", "Sodium", "Radar". Still, any scientifically trained adult should

find learning a language by constructing sentences about solar radiation preferable to reading about "the black cat of my aunt", and for that reason the book can be recommended to those practising even such "neglected" branches of science as horticulture.

E.U.

1999. PYENSON, L. L.

Elements of plant protection.

John Wiley & Sons Inc., New York, and Chapman & Hall Ltd., London, 1951, 8½ × 5½ in., pp. 538, illus., \$4.96 or 40s.

In the Foreword it is stated that "This volume has been prepared as a text and source book for students in vocational agricultural classes in high schools, in technical institutes, and in the early years of agricultural colleges". It should serve this purpose admirably, and yet there is something rather repellent about it for the young biologist who may have acquired a love of plants and likes to seek what is attractive in plant life. As the title infers, the book is devoted to plant diseases, disorders and pests, and the reader might get the impression that to grow a plant without elaborate precautions or exertions is impossible. This may be emphasized by the first sentence of the Introduction thus: "The cultivated plant is the battleground where the interests of man meet and clash with those of innumerable organisms and phenomena of Nature". We feel that more stress should be placed on providing the plant with a congenial environment that will give it a good start in life and stimulate its healthy development. This, however, brings us more into the realms of plant physiology than of plant pathology, yet the plant pathologist should know the rudiments, at any rate, of physiology in order to appreciate the reaction of the plant to unfavourable conditions. The book before us seems to touch on all conceivable factors detrimental to the plant's healthy development, with the corresponding measures for overcoming them, and it should give the student not only glimpses of all those aspects but also a bias towards some particular side line that he may find specially attractive. The subjects dealt with include insects (in general and as crop pests) in nine chapters, mammals and birds injurious to agriculture, plant diseases caused by fungi, bacteria, viruses and "physiopathies", and their control, weeds and herbicides, application and equipment (its selection, care and manipulation). The new synthetic preparations as fungicides and insecticides are succinctly mentioned. The ground covered is so wide that details of particular diseases or pests are not included. Such details are not relevant to the scope of the book and would make it much too large to serve the purpose for which it is intended. The parasites and pests mentioned are mostly introduced for the purpose of illustrating types, and there is a wide selection. Illustrations are numerous and good. The price is rather high for the young student who, however, should have free access to it on the library shelves.

H.W.

2000. RANDHAWA, M. S.

Developing village India.

Published under the authority of the Indian Council of Agricultural Research by Orient Longmans Ltd., Calcutta, revised edition 1951, 10 × 7 in., pp. 290, illus., bibl. 285 [76 horticultural], Rs. 10/-.

The fifth section of this beautifully illustrated and easily read book, pp. 195-224, is devoted to horticulture, separate subsections affording advice on planting trees in villages, and the cultivation in the village orchard of mangoes, citrus and papayas, and finally vegetable growing. Other main headings are Organization, Publicity and propaganda, Agriculture and nutrition, Animal husbandry, Cottage industries, Health and sanitation and Education and culture.

D.A.

2001. RAPER, A. F., AND RAPER, M. J.

Guide to agriculture U.S.A.

Agric. Inf. Bull. U.S. Dep. Agric. 30, 1951, pp. 82, bibl. 30, illus., 50 cents.

This provides clear and well illustrated information on the land of the United States, how it is used, the major crops and where they are grown and the chief livestock. Diagrams show the distribution and areas under different crops including the main fruits, vegetables and nuts. Research and advisory facilities are outlined, both Federal and State.

2002. ROBINSON, R. A.

Market gardening.

C. Arthur Pearson Ltd., London, 1951, 7½ × 5 in., pp. 189, illus., 7s. 6d.

A useful pocket book for the would-be small-scale market gardener in England. Practice and practical advice fill its covers.

2003. ROYAL HORTICULTURAL SOCIETY.

The fruit garden displayed.

Royal Horticultural Society, London, and Oxford University Press, London, 1951, 8½ × 6½ in., pp. 176, illus., paper-backed 6s., boards 8s. 6d.

The man with the small garden who wishes to grow fruit may well be daunted by the multiplicity of problems that he is faced with. Space is limited, the ground "came with the house" and was probably not chosen for its fruitgrowing capacity, manure is scarce and expensive, and "blights" and "grubs" are only too happy to remain unidentified. He will find this new R.H.S. publication, a sister volume to *The Vegetable Garden Displayed*, an invaluable guide. In it are summarized, with the aid of numerous and explicit photographs, the essential principles of planting, manuring, pruning, etc., and the findings of modern research on such subjects as rootstocks, varieties and pest control in so far as they affect the amateur. Plans are given of model fruit gardens of various sizes showing how, by careful planning, it is possible to grow a selection of apples, pears, and stone and soft fruits in an incredibly small space. There are also useful hints on renovating a neglected fruit garden, so often the heritage of the amateur, an account of how to make a compost heap to supplement the usually inadequate supply of manure, lists of good varieties with advice on their pollination requirements, and a simplified spray programme. It is a pity that this useful handbook should be marred by two unfortunate points of production which will cause the reader some inconvenience: the pages do not turn back flatly enough for the lefthand side of the first half of the book to be read in comfort, and, owing to the numerous photographs, many of the pages are not numbered, a particularly

frustrating omission as the reader is constantly being referred from one section of the book to another.

P.R.-D.

2004. SOULE, M. J., Jr.

A bibliography of the mango [Mangifera indica L.].

Published jointly by Florida Mango Forum and University of Miami, 1950, 9×6 in., pp. 89, bibl. about 1,300. \$1.00.

The mango is the most important fruit in India and is now found and esteemed throughout the tropics. It is therefore rather surprising, as the author points out, that the only general bibliographies produced on the crop have emanated from the United States. The present one is the most comprehensive that has appeared so far. Mr. Soule has wisely avoided becoming entangled in the ancient literature of India and the Far East which contains many legends about the fruit and references to its religious significance in Hindu mythology. Instead he has clearly been to great pains to examine all the likely sources of literature on the mango as a crop plant, including, we are glad to see, our own *Horticultural Abstracts*, and has assembled some 1,300 references. These are arranged in an eminently practical manner in a subject index containing twenty-two sections covering all aspects of the crop from its history and botany to its marketing and refrigeration. The references in each section are lettered as well as numbered and this arrangement makes it easy to use the cross references given at the end of each list and simplifies the country, author and periodical indexes that follow the subject index. The bibliography should be of great help to anyone working on the mango and may also perhaps draw attention to the obvious lack of a balanced programme in research efforts made in the past. Only 22 papers are listed as primarily concerned with the culture of the mango, 7 with soil and fertilizer requirements and 2 with climatic effects, whereas 114 are concerned with propagation, 100 with diseases and 175 with pests.

G.K.A.

2005. TYSSER, H. F. (Editor).

The fruit annual 1951-1952.

British-Continental Trade Press Ltd., 222 Strand, London, 9½×6 in., pp. 408, 20s.

Those concerned in any aspect of the fruit trade will once more find this Yearbook a very useful source of information. Surveys appear, as usual, on the world fruit trade, world citrus crops, some tropical crops, the dried fruit trade and edible nuts. Other regular items are The fruit supply calendar, Dictionary of fruit terms in 5 languages, Fruit trade organizations, Journals of interest to the trade, Fruit shippers' guide and a Directory of the world fruit trade. Special articles in this volume are those on Fruit grading machinery, Progress in refrigerated gas storage, Recent developments in the canned fruit trade, and Road transport of fruit.

2006. UNITED STATES DEPARTMENT OF AGRICULTURE.

Crops in peace and war, being *Yearbook of Agriculture 1950-1951*, 1951, Supt. Documents, Washington, D.C., pp. 942, \$2.50.

Among others separate sections are devoted to (1)

potatoes, (2) vegetables and some fruits, (3) sugar, honey and maple. *Potatoes*. Here are articles entitled Food and feed from white potatoes, Processing of potatoes for food [including dehydration, canning and prepeeling], Making of potato chips, Chemicals we get from potatoes [e.g. utilization of surplus potatoes in the fermentation industry and various microbiological processes]. The scientist has still to find practical fermentations based on potatoes in which their use is economical. Sweet potatoes: more than starch, and Sweet potatoes for food and feed, are two further titles. *Vegetables and some fruit*. A general article on the value, composition and production of the chief vegetables grown in the U.S.A. is followed by one entitled Nine principles for freezing vegetables and another The art of drying vegetables. In the last a new process known as "dehydro-freezing" is noted for the preservation of vegetables, the object being to effect economies in packing, storing and transport without altering the essential fresh quality of the vegetable. Other articles give the latest news on cucumber pickling, on floating peas to clean them and on the production of mushroom mycelium.

As regards fruit the food uses and utilization of fruits are the chief points discussed in articles which include one on flavour in fruit, its chemistry and origin, another on the manifold values of the apple, a short, important note on the chemistry and technology of citrus fruits and their products and yet another on the economic utilization of citrus waste, such as molasses and press juice, in the production of citric acid, oils and different kinds of pectin. Finally, short articles are devoted to dehydration of fruit, preservation by freezing and the use of frozen lockers.

Sugar, honey and maple. The following subjects are considered: Production and use of sugar cane, sources and values of honey, and maple tree products. The author of the paper on maple sugar states that a new process has now been developed whereby the flavour of maple syrup can be greatly intensified, a great asset in dealing with this product. The authors of the different articles are all persons of some authority in the fields which they discuss.

D.A.

2007. WALLACE, T.

The diagnosis of mineral deficiencies in plants by visual symptoms-

H.M. Stationery Office, London, second edition, 1951, 6×9½ in., pp. 107 and 312 coloured plates, 35s.

The second edition follows the same lines as the first.* There are a few additions to the letterpress, thus brief mention is made of molybdenum which has become of greater interest since the first edition.

A whole-page table is devoted to "healthy and deficiency values of mineral elements in various crops". An appendix has been added to Chapter III on "Details of technique for chemical tissue tests". This occupies eight pages. There are 312 coloured plates, compared with 114 in the original edition, and 209 in the Supplement to that edition. Their quality is much improved. They are arranged according to plants, instead of according to deficiency, as in the original edition and Supplement. This is a great advantage to anyone using the book in the field.

W.A.R.

* For previous reviews see H.A., 13: 1089, 15: 923.

Reports.

2008. AUSTRALIAN CANNED FRUITS BOARD.

Twenty-fifth Annual Report of the Australian Canned Fruits Board for year 1950-51, 1951, Melbourne, pp. 28.

The report concerns the production and export of canned peaches, pears, apricots and pineapples in Australia. The production of the different States is shown and the countries to which exports go. The chief of these are the U.K., New Zealand, and Canada.

2009. BALSÅRD (GRANHALL, I.).

Föreningen för Växtförädling av Fruktträd. Verksamhetsåret 1950. (Annual Report of the Society for Fruit Tree Breeding, Balsgård, for 1950), 1951, pp. 16.

In this report a brief survey is given of the Society's work at Balsgård on fruit breeding and selection, rootstock selection and the inducement of mutations in fruit trees. More detailed papers on the results obtained are published in *Sver. pomol. Fören. Årsskr.*, 1951, Vol. 52, abstracts of which appear in this number of *Hort. Abstr.*

2010. CAWTHRON INSTITUTE.

Annual Report of the Cawthron Institute, Nelson, New Zealand, 1950-51, pp. 38.

Plant nutrition investigations. A study of the zinc status of hop plants showed that the Zn content of the cones is much higher than that of the leaves, the leaves from the top of the bines being richer in Zn than those from the middle or bottom. Analyses of the roots of hops showed that those of the Californian variety were appreciably higher in K and P_2O_5 , but slightly lower in N, than those of the Greenbine variety. The minor element status of leaves and stalks of celery and leaves and curds of broccoli was determined. *Fruit research.* Borax treatment effectively controlled die-back of raspberries. A distinct carry-over of benefit was observed from a borax spray applied the previous season. The recommended dressing of $\frac{1}{2}$ oz. borax per plant has given very good results in established gardens, but on young plants it is likely to cause edge-burn of the leaves. Double Vigour stock (French Crab vegetatively propagated) continued to give better results than Northern Spy for the Statesman apple variety as regards both tree growth and yield. The total yields since 1939 have been 1,520 lb. per tree for Northern Spy and 1,882 lb. per tree for Double Vigour. A clonal Epp's Seedling stock gave greater growth and higher yields than Northern Spy with both Cox's Orange and Jonathan. Further work has been done on the distribution of apple collar-rot and on varietal susceptibility to the disease. *Tomato research.* Studies have been continued on the effect of steam and soil disinfectants on the yield and quality of glasshouse tomatoes. Steam, chloropicrin, DD, and a mixture of DD and chloropicrin all gave good growth, high yields and a high percentage of first-grade fruit; sterilal again gave disappointing results. In a comparison of the value of compost, sawdust and cocoa bean husks for the treatment of glasshouse soils, compost used at the rate of 15 tons per acre again gave the highest yields per acre, but cocoa bean husks increased yields substantially and resulted in a slight improvement in

quality. Further observations have confirmed the opinion that hard-core is caused by potash deficiency. Limited watering and additional applications of K, or K and N, have reduced it but have also decreased yields. *Hop research.* A soil fertility survey was made of hop gardens in the Nelson district; the majority of the gardens showed a low level of K. A widespread deficiency of Bo has been identified in hop gardens on soils derived from granite or Moutere gravels. The symptoms were delayed growth in the spring and a distortion of the leaves on young shoots. The use of borax at the rate of $\frac{1}{2}$ oz. per hill promoted healthy growth. Disinfection of hop crowns, when opened up for pruning in the spring, with borax, common salt or cuprox resulted in improved growth of shoots. The extent and nature of the root systems and the susceptibility of different parts of the root system to attack by black root-rot was studied in Californian and Greenbine hops. Disease was usually confined to roots in the surface layer, and the point of infection was generally the crown. *Tobacco research.* Surveys have been made of tobacco diseases. Experiments have been carried out on the control of mosaic, black root-rot and verticillium wilt. Chloropicrin, DD, and calcium cyanamide were effective in controlling black root-rot in seedbeds, while sulphur, at the rate of 12 cwt. per acre, gave good control in a heavily infected field. Studies have been made of the boron intake of tobacco and the chemistry of the curing process. *Entomological investigations* include work on the control of the grass grub (*Odontria zelandica*), the grass caterpillar (*Oxycanus* sp.) and the green vegetable bug.

2011. COSTA RICA (SOLÍS ROJAS, F.).

Reporte del trabajo de un año de labores de la sección del café 15 de Julio de 1950 á 15 de Julio de 1951. (Report of the Coffee Section [Ministry of Agriculture, Costa Rica] for the year 15 July 1950-15 July 1951.)

Suelo Tico, 1951, 5: 137-51.

In this first year of its existence the Coffee Section of the Ministry was concerned mainly with developing extension work and establishing trials in various parts of the country. No results are published. The trials are designed to investigate NPK and minor element problems on different soils, to compare the drinking quality of the varieties Arábigo común and Híbrido Tico, to select high yielding strains, and to study the effect of pruning and certain soil management practices.

2012. DOMINICA.

Annual Report of the Department of Agriculture for the year 1948, pp. 33 [received December 1951].

This report includes a summary of the results of 2 sugar cane variety trials, a note that soil conservation measures adopted at the lime experiment station have worked efficiently, and information on the establishment of a cacao propagation station.

2013. FIJI.

Annual Report Department of Agriculture, Fiji, for 1950, 1951, pp. 40, 4s.

The report of the Entomologist include a note on the control of the banana scab moth, *Nacoleia octasema*,

with DDT emulsion (20% p-p'-isomer). Spraying the unopened fruit bunches with 1 part by volume of emulsion to 100 parts of water gave control in both wet and dry weather; 1 in 250 was effective in dry weather; 1 in 50 caused some bunches to fall off. Spraying did not eliminate the need to dust with DDT when the bunches reached the horizontal position. Laboratory tests on the coconut stick insect, *Graeffea crouani*, which caused severe defoliation in certain areas, indicate that Gammexane dust (0.5% γ -isomer) is very lethal to it, but that DDT dust (2% p-p'-isomer) is ineffective.

2014. GUATEMALA.

Informe del Instituto Agropecuario Nacional por el periodo de Enero 1948 a Junio 1949. (Report of the National Institute of Agriculture for the period January 1948 to June 1949.) [Spanish and English.] Undated, pp. 79+57, illus.

This Institute is the co-operative concern of the governments of Guatemala and the U.S.A. It was founded in 1944 as the Estación Experimental de Cinchona to investigate problems of quinine production, but in 1945 the scope of its activities was extended to include problems of general agriculture and its name was accordingly changed. It now consists of the central laboratories in Guatemala city and 2 field stations, Labor de Ovale where work is done on cereals, legumes and sheep, and Chocóla where coffee research is carried out. This report, written in Spanish and English, gives an outline of the research programmes and some of the results so far obtained. The following items are of horticultural interest. *Coffee*: Planting material is being improved by selection and breeding. Preliminary results of cultural experiments indicate that (1) nurseries may be on the same site for several years if chemical fertilizers are used, (2) there is no real advantage in balled-root planting over bare-root planting, and (3) chemical fertilizers will not materially increase yields of bearing coffee. Vegetative propagation trials indicate that it will be possible to root cuttings in open beds with temporary shade if a cool, moist site is chosen. *Fruit*: Good varieties of citrus and avocado are being imported, selected and propagated. *Bamboos*: 25 introduced species of bamboo are being tested and propagated. Cultural practices with *Bambusa vulgaris* grown for paper manufacture are being studied. *Cinchona*: The field performance of selected clones is being studied. It seems that none of the present ledgeriana selections are worth commercial consideration. *Citronella*: The possibility of overcoming the problem of declining yields by crop rotation is being investigated. *Sugar cane*: Out of 60 introduced varieties, 7 have proved outstanding in yield and disease resistance and are being distributed, e.g. P.O.J.2878, P.O.J.2714, B.3439, B.3138, B.35187, M.28 and S.C.124. *Chemistry*: The fat and protein contents of a native nut, *Virola guatemalensis*, have been determined. It was found that the refractive indices of citronella oils could not be used for determining the citronellal content of the oils. Experiments showed a positive correlation between the moisture content of stored pyrethrum flowers and pyrethrum losses during storage. There are indications of a correlation between bark weight and quinine content of cinchona trees; methods of sampling

cinchona bark were compared. *Pathology*: Stripe canker of cinchona was found to be caused by *Phytophthora cinnamomi*. The spread of the disease followed a downhill direction. *C. micrantha*, *C. microphylla* and *C. australis* appeared to be resistant, while all but one, Z-15, of the clones tested were susceptible to artificial inoculation. Z-15 was susceptible in the field, thus indicating the existence of physiological strains of the fungus. Girdle canker of cinchona was found to be caused by *Phytophthora parasitica*, the fungus entering the host through the leaves and twigs of suckers. Resistance to girdle canker was much more common than to stripe canker.

2015. JAMAICA (WRIGHT, J.).

Department of Agriculture, Jamaica. Investigations 1949-1950.

Bull. Dep. Agric. Jamaica 47, 1951, pp. 127, 28.

Items of horticultural interest in this comprehensive annual review of experimental work and observations includes:—*Furcraea*: Leaves of the local *F. cubensis* yielded nearly 3% of dry fibre. Another species with fewer marginal thorns yielded 1.2%. *Okra*: The variety Evergreen was found to have a seed oil content of 17.9%, and Long Green 15.7%; yields on 2 stations ranged from 320 to 760 lb. per acre. *Potatoes*: In 2 out of 3 fertilizer trials N and P gave significant yield increases. Three more trials have been started, as have variety trials and an investigation on methods of controlling eelworm. *Plant pathology*: The sugar cane variety B.34104 growing on a soil with pH 9.0 has shown marked chlorosis; Mn deficiency is suspected. An isolated case of Panama disease has been identified on Lacatan bananas. *Avocadoes*: A preliminary trial suggests the practicability of transplanting budded avocado plants with bare roots. *Bananas*: Trials with new varieties were continued. Treatment of small pieces of corm with beta-indolebutyric acid retarded germination. In a trial to test the suitability of small suckers as planting material "sword" suckers 22 to 51 in. long, cut back 6 in. above the corm and planted upright, proved quite suitable under dry conditions. An attempt to increase sucker production in varieties 141 and 202 by "goosenecking" 6-8 ft. high followers was unsuccessful; it stimulated the early growth of a few suckers but reduced the total number produced. In a spacing trial with Lacatan planted on the square 8 ft. 3 in., 5 ft. 6 in. and 4 ft. 1 in. the number of suckers produced declined sharply as the spacing decreased; increasing the dressing of N did not increase sucker production; removing suckers as "peepers" instead of "swords" increased the total number of suckers produced per stool, but on light land caused most of the plants to fall over. Further investigations on suckering, several management studies and studies on Panama disease have been started. *Cacao*: Trials on the rooting of cuttings in propagators and open beds are outlined. A preliminary trial of circumposing [marcotting] cacao, wrapping the girdles in damp sphagnum moss and enclosing them in a rubber plastic cover, resulted in rooting in 5 weeks. *Cashew*: Records tabulated of the numbers of ♂ and ♀ flowers and number of fruit reaped on 10 orchard trees selected for their uniformity revealed great variability between the trees. *Citrus*: Rootstock and cultivation trials are

in progress. Trees sprayed with 3% Methoxone have remained free of epiphytes for 18 months. *Coconuts*: In a cultivation and manuring trial on young coconuts F.Y.M. and N produced a significantly greater degree of greenness in a tall type and F.Y.M. gave a similar result with a dwarf type. The results to date of an experiment to correct debility of standing palms suggest that a grass cover may be deleterious, resulting in fewer inflorescences and retarded flower production and fruit setting; forking appears to be giving better results than billing weeds; NK, NPK and F.Y.M. appear to be the best fertilizers for inflorescence and flower production and fruit setting. Investigations are in progress on the "Unknown" disease and on die-back or silver leaf disease. *Coffee*: Selection work and mulching and fertilizer trials are in progress. *Mangoes*: In a rootstock trial in its 5th year trunk diameter measurements show that the varieties Bombay and Julie have grown best on Kidney, Turpentine and Beef stocks, while Haden has grown best on Turpentine, Beef and Cox. Trials have shown that with suitable care mangoes can be transplanted from the nursery bare-root; stocks budded with Julie have shown quicker root regeneration than when the scions were Bombay or Haden. *Other investigations* include geranium oil, peppermint oil, muskmelon varieties, oil palm introductions, pineapple varieties and fertilizer and hormone spraying trials on tomatoes.

2016. KESTEREN.

Verslag van de stichting "Boom en Vrucht" te Opheusden over de jaren 1949-1950 en Verslag van het onderwijs en onderzoek in het Rijkstuinbouwconsulentschap Kesteren over de jaren 1949-1950. (Report of the "Tree and Fruit" Institute, Opheusden, for 1949-1950, and Report on the extension and research work of the State Horticultural Advisory Service in Kesteren for 1949-1950), pp. 97.

These reports contain accounts of the opening of the new buildings of the Institute at Opheusden in the Kesteren district, near Wageningen in Holland, the scope of its educational, extension and research work, the layout of its trial grounds which are the centre of the State Horticultural Advisory Service in Kesteren, and results of experiments carried out there. Experiments reported include manurial trials with apples, studies of factors affecting cherry quality, investigations into the cause of blotchy ripening of tomatoes, scab control on apples, the effect of borax and growth substance sprays and time of spraying on incidence of bitter pit in apples, the effect of growth substance sprays on percentage fruit set in apples and cherries, chemical blossom thinning of apples, hand thinning of blossoms and fruit, the use of wax emulsions to retard flowering in cherries, pears and apples, and gas storage of Jonathan and other apple varieties.

2017. LAUSANNE.

Stations fédérales d'essais viticoles, arboricoles et de chimie agricole, Lausanne et Pully. Rapport d'activité 1950. (Annual Report of the Lausanne Horticultural Research Station for 1950.) *Landw. Jb. Schweiz*, 1951, 65: 823-952, bibl. in text.

Viticulture: Cases of infectious degeneration of vines have been confirmed in French Switzerland. Experiments on the time of taking vine rootstock cuttings showed that the ripeness of the wood has a considerable influence on the percentage of successful grafts. The effect of the quality of the lime used in bordeaux mixture on the phytotoxicity of the spray was investigated. *Fruitgrowing*: (1) Microscopic observations on the development of an apple shoot during the dormant period showed that maturation does not continue much after leaf fall. The water content is then at its lowest level and that is the best moment to collect scion wood to be stratified during the winter. Anatomical and histological changes during the dormant period were small. Where the water/dry matter ratio was equal to, or higher than 1, the tissues were very susceptible to frost damage. (2) A comparison of the effectiveness of the Frostguard burner, which emits infra-red rays, with the Californian burner for frost protection in orchards showed that good protection could be obtained with 5 Frostguard burners per ha. as compared with 120 Californian burners, the cost being 7,500-10,000 Fr. and 6,000 Fr. per ha. respectively. The maintenance cost of the former was somewhat the lower. (3) Observations were made on the occurrence of virus symptoms on stone fruits. (4) Trials on the control of fruit tree mites indicated that winter sprays of 4% yellow oil were not alone sufficient to control *Metatetranychus ulmi*. Post-blossom treatment with phosphoric esters suppressed the initial populations of this species but further fortnightly applications were required throughout the summer. Rotenone products were only satisfactory as acaricides in special cases. Either a winter oil spray or a spring phosphoric ester spray controlled *Bryobia praetiosa*. (5) Lists are given of the primary, secondary and rare hosts of the San-José scale recorded in Switzerland. (6) A method of fumigating fruit trees with HCN under a tent for control of San-José scale has been developed and found practicable. (7) From storage trials with pears it is concluded that only the varieties Passe-Crassane and Winter Nelis can be stored satisfactorily in an atmosphere of 10% CO₂. Doyenné du Comice requires a lower concentration of CO₂.

2018. MAINE.

Research on Maine Farm Problems, being 67th Annual Report of Progress, Year ending June 30, 1951, 1951, pp. 80, illus., issued as *Bull. Me agric. Exp. Stat.* 491.

Informative notes on horticultural projects concern: *Apples*—control of fruit fly, European red mite, oyster-shell scale and scab, hardy rootstocks, breeding, fertilization, handling after harvest. *Beans*—weed control, breeding and variety trials. *Blueberries*—weed control, fertilization, irrigation, frost injury, pests and diseases, breeding. *Broccoli*—variety trials, freezing. *Cherries*—experiments on sour cherry culture. *Corn*—variety tests and fertilization of sweet corn. *Cucumbers and melons*—breeding. *Irrigation*—of processing peas, beans and corn. *Peas*—fertilizer and variety trials. *Potatoes*—early and late blight control, the control of spindle tuber and other diseases, virus diseases and aphid population trends, development of leafroll-resistant varieties, fertilizer placement trials,

control of tuber size, effect of harvest dates on yield, specific gravity and quality, harvest and after-harvest handling. *Raspberries*—variety trials. *Strawberries*—breeding trials and vitamin C content. *Vegetables*—tomato variety trials and vitamin C content, the use of phosphorus on beans, corn and tomatoes.

2019. MAURITIUS.

Annual Report of the Department of Agriculture, Mauritius 1949, 1951, pp. 78, published by the Government Printer, Port Louis, as No. 25 of 1951, price R. 1.

Sugarcane Research Station: In the Cane Breeding Division work is reported on breeding, selection and variety trials including Barbados varieties that show promise. Trials to induce and control arrowing in B.H.10/12 and R.P.8 by photoperiodism and geotrophic stimulation have given negative results. The only practical method of storing pollen consisted of keeping it in small glass tubes in a refrigerator; Uba Marot pollen, thus stored, remained fertile for 10 days. An experiment has been started to compare planting material of M.134/32 obtained from 5 sources. In the Botany Division comparative trials of the herbicides Fernoxone and Agroxone gave similar results. In 4 trials of interplanting food crops and sugar cane the cane was not affected in 2 cases but showed significant reductions in yield in the other 2. A root pruning treatment simulating the effect of grubs of *Clemora smithi* applied to varieties M.213/40 and M.423/41 both as plants and ratoons resulted in little difference between the treated plants and the standard M.134/32 plants. For the treatment of setts against pineapple disease the best materials were Agrosan GN, Hortosan DP, Aretan and Abavit S. In the Chemical Division 15 NPK trials showed yield increases of 30% and 41% from 30 kg. and 60 kg. N per arpent respectively but only small responses to P and K, though these are showing a steady increase with successive crops. A second series of 5 trials involving 3 levels of Ca, K and Mg showed no responses to Ca or Mg but a significant response to K in 2 cases. A trial started in 1947 involving applications of basalt at 0, 91 and 182 tons per arpent combined with 2 levels of fertilizer and 2 varieties showed significant yield increases from both basalt dressings of 3.1 and 5.8 tons respectively, but the difference between the two dressings was not significant. *Agricultural Division:* Propagation trials are reported on a number of fruit trees and ornamentals. For mangoes the patch bud used in Malaya for hevea was the most promising method tried, provided it was applied between December and February inclusive. For avocados, grafts with terminal buds have been inserted into T incisions a few inches above the collar with about 80% success. Trials are being made on the side-grafting of litchi onto *Euphoria longana*. Root cuttings set in a solar propagator are being used successfully to multiply bread fruit, guava, caripoullay (*Murrya koenigii*) and *Cassia calceolaria*, and trials are under way with kaki and pecans. A method has been evolved for raising *Eupatorium pallescens* from seed. The production of European vegetable seeds has become a permanent part of the Division's work, and a table shows the quantities of seed of each of the varieties produced in each of the past 5 years. Crop field trials recorded include a garlic trial in which a

green yield of 3.3 tons per acre was obtained leaving a net yield of 2.3 tons after deducting the weight of "seed" used. Two plots of coriander yielded 725 kg. and 732 kg. of seed per acre, a plot of okra yielded 2,010 kg. per acre and one of small lentils 78 kg. of air-dried seeds per acre. In an onion trial sets planted in March yielded 8.90 m. tons of fresh bulbs per acre, drying out to 4.45 tons; 6 applications of 0.25% Agrocide solution successfully controlled thrips. In a low-yielding sweet potato trial a crop grown from tubers yielded 700 kg. per acre compared with 1,250 kg. for a crop raised from cuttings. *Tobacco Research Station:* Information is given on diseases and pests, plant breeding and variety trials. Fertilizers involving 3 levels of N, P and K showed no significant differences in an Amarello trial, a Virginia flue-cured trial, or in 3 white Burley trials. In a soil fumigation trial with 2 varieties in 1948 DD applied at 3 rates significantly reduced nematode infection but significantly increased black shank infection. A similar experiment in 1949 with 4 varieties showed DD to give only partial control of nematodes and to have no significant effect on black shank or yields. Sodium chlorate at 15% gave good results in controlling *Cynodon dactylon* before planting a Burley crop; the tobacco grew normally, and it was observed that its roots remained free from nematodes. *Entomological Division:* Work on the sugar cane white grub *Clemora smithi* comprised biological control, trials with BHC and estimations of soil populations. In an attempt to control the black sage weed, *Cordia macrostachya*, the insects *Schematiza cordiae* and *Eurytoma* sp. have been introduced from Trinidad; an earlier introduction, *Physonota allutacea*, is considered a failure. *Division of Plant Pathology:* Information is given on the diseases of sugar cane, tobacco including a new type of enation disease, filao (*Casuarina equisetifolia*), banana, coconut including wilt associated with the presence of mites, eucalyptus and loquat.

2020. MAURITIUS.

Annual Report of the Department of Agriculture, Mauritius 1950, 1951, pp. 92, published by the Government Printer, Port Louis, as No. 43 of 1951, price R.1.25.

Sugarcane Research Station: The Cane Breeding Division reports the release of M.423/41 in 1950. Other promising canes include M.231/40 and E.1/37 and the Barbados canes B.34107 and B.37172. B.37161 gave less good results in ratoon than in plant cane, B.3337 yielded heavily as plants and first ratoons but had relatively poor juice quality, while B.4098 and B.3439 proved inferior. Differences in cane yield of M.134/32, the most widely grown variety, were found to be correlated with source of planting material. The Chemistry Division reporting on a series of NPK trials in their fourth ratoons records that 30 kg. N increased cane yields by 37% while an additional 30 kg. N produced a further increase of 15%, but over the 5 crops the increased application of N caused a marked reduction in sugar content; Ph ad no effect on yields, K significantly increased yields in 2 cases; neither had much effect on sugar content. In four Ca, Mg, K trials no responses were obtained from Mg and K but in one trial there was a significant response to Ca. A single application of 182 tons of crushed basalt per arpent increased cane yields over 3 crops by 15 tons per

arpen and may also possibly have increased C.C.S. *Agricultural Division*: Patch budding has been adopted as standard practice for mangoes; it generally gives about 50% take, though little success has been achieved with the varieties Baissac and Aristide. A new method of grafting peaches has been devised and will be described in another publication. Attempts to graft litchi on *Euphoria longana* have been unsuccessful. Good results have been obtained with root cuttings of kaki in a solar propagator. Quantities of European vegetable seeds produced since 1947 are listed, and the yields per acre of several vegetable crops are recorded. In one of three potato trials Malgache proved more blight-resistant than, and out-yielded, Up-to-Date; in the other trials variety 134 outyielded Up-to-Date. The sweet potato variety Joes yielded better when raised from cuttings than from tubers. An experiment is described in which leaves of furcraea and sisal were cut at intervals of 6, 12 and 18 months over 3 years. The number of leaves cut per plant was similar in all cases but the number cut per acre from furcraea in the 18-months plots was much smaller than in the other plots owing to the greater incidence of poling. The yield of dry fibre per acre, however, was highest from the 18-months plots of both plants owing to the greater maturity of the leaves. The percentages of poling for the 6, 12 and 18 months cuttings were furcraea 0, 0 and 7.8 respectively and sisal 6.2, 35.0 and 48.4 respectively. The mean lengths of furcraea leaves cut at the 3 intervals are recorded. Moisture losses in aloe leaves stored in different ways are tabulated. Trials in progress on methods of packing litchis for air shipment appear to indicate that sawdust with 25% added moisture is the best packing. *Tobacco Research Station*: Work at this station consisted mainly of breeding and selection among Amarello and flue-cured varieties. *Entomological Division*: Trials with BHC against the sugar cane white grub, *Clemora smithi*, have shown that applications of 50, to 100 kg. dust containing 2.6% γ -isomer made before the adults emerge reduce infestation. This occurred whether the BHC was applied to the open furrows at planting time or in bands beside the cane rows after germination, but the former method retarded the early growth of the cane, though it did not materially affect the final yield. Studies on the biological control of the black sage weed, *Cordia macrostachya*, have been published elsewhere. *Plant Pathology Division*: Mention is made of diseases of sugar cane, tobacco, tea, casuarina, ginger, potatoes, several vegetables, and gladioli. *Chemical Division*: Analyses of aloe residues from factories showed these to be too low in fertilizing elements to be of much value in composting. *Sugar Technology Division*: Milling tests on new varieties showed that, by comparison with the standard variety M.134/32, E.1/37 possesses very good milling qualities while M.213/40 is definitely inferior.

2021. QUEENSLAND.

Annual Report of the Department of Agriculture and Stock for the year 1950-51, 1951, pp. 95, illus.

The following items are extracted from the reports of Branches of the Division of Plant Industry:—*Agriculture Branch* (pp. 27-33): Mention is made of the results of variety, spacing and fertilizer trials with potatoes,

variety and time of planting trials with onions, variety trials with sweet potatoes, investigations into the cost of plucking tea by hand and into the use of the Tarpen tea cropper, fertilizer, and irrigation and rotation trials with tobacco. *Horticulture Branch* (pp. 37-41): With pineapples investigations included the use of sodium pentachlorophenate alone and in emulsions with diesel oil to control weeds, the intercycle planting of Poona peas to improve the growth of replant crops, fertilizer trials, the use of α -naphthaleneacetic acid applied to maturing fruit to delay ripening and increase size, methods of handling fruit destined for canneries and the control of black heart by borax sprays. With bananas 2,4-D has proved useful in destroying old and diseased plantations, and investigations are mentioned on the size and type of planting material, on the effects of temperature during transport and on quick-freezing. With papaws work has been done on methods of ripening fruits in the winter, on varieties and on canning and quick-freezing. With mangoes promising results have been obtained in canning and quick-freezing the variety Kensington. With tomatoes, studies included the use of hormone sprays to induce fruiting, varietal trials and spraying with ammonium molybdate to redress nutritional deficiencies. Other crops referred to include citrus, apples, grapes, strawberries, custard apples, macadamia nuts, avocados, beans and other vegetables. *Bureau of Sugar Experiment Stations* (pp. 42-5): Investigations on sugar cane included variety trials, 7 fertilizer trials, a study on copper deficiency found in the Maroochy area, trials with herbicides particularly for post-emergence spraying, the effect of BHC applied against greyback beetle grubs on the germination of setts and root growth of cane, the use of BHC against third-stage frenchi grubs, studies on varietal resistance to, and the use of copper and sulphur sprays against, yellow spot disease, and observations on other diseases. Cane breeding activities included an attempt, so far unsuccessful, to delay arrowing by the use of powerful electric lights, and the collection of 165 varieties of wild canes in Papua. *Science Branch* (pp. 46-9): Surveys were made on the distribution of various weeds and spraying tests with 2,4-D were carried out on some of them. Disease studies included the effect of varying rotations on potato diseases, sprays to control brown rot of stone fruits, treatments to prolong the storage life of citrus fruits and citrus seeds, spraying to control fig rust, attempts to find strains of passion fruit resistant to the fusarium which causes wilt, methods of controlling top rot and base rot of pineapples, investigations on custard apple fruit rots and die-back disease of papaws, tests of disease-resistant strains of tomatoes and other vegetables and attempts to find a better fungicide than bordeaux mixture to control powdery and downy mildews of cucumbers. Entomological investigations included studies on the control of fruit flies and pests of citrus, tobacco, potatoes, vegetables and pineapples.

2022. S. RHODESIA DEPARTMENT OF AGRICULTURE (HAYTER, C. N.).

Summary of Annual Report of the Horticulturist for the year ended 30th September, 1950.

Rhod. agric. J., 1951, 48: 439-42.

Rhodes Inyanga Orchards: DNOC oil sprays at 5%

applied to apples, pears and peaches had a marked effect in preventing delayed foliation. With apples in particular the blossoming and foliation of sprayed trees was nearly 3 weeks earlier than those of unsprayed trees. Pre-harvest hormone sprays to prevent fruit drop in apples did not give significant results, but trials are being continued. Bordeaux mixture gave good results in experiments to control the bitter rot disease of apples and pears. East Malling apple stocks grafted with six varieties have behaved as under European climatic conditions. *Sub-tropical Experiment Station, Umtali*: This station has been closed down.

2023. S. RHODESIA DEPARTMENT OF AGRICULTURE (HOPKINS, J. C. F.).

Summary of Annual Report for the Branch of Botany and Plant Pathology for the year ended 30th September, 1950.

Rhod. agric. J., 1951, 48: 454-9.

Research work outlined briefly includes: *Tobacco*: The main lines of research on frog-eye and alternaria leaf spot are being published in the report of the Tobacco Research Station, Trelawney. *Apples*: Spraying with 2-2-50 bordeaux gave good control of bitter rot in White Winter Pearmain and also reduced the amount of fruit breakdown in storage. Soil applications of borax to Ohinemuri apple trees did not reduce fruit cracking but increased growth and total yield for the second year in succession. *Sugar cane*: Satisfactory control of smut has so far been obtained in the less susceptible varieties by removing smut whips. *Erigeron canadense*, a weed in cane fields, proved susceptible to 2,4-D. *Other plants*: Species of *Strophanthus*, including *S. petersianus* and *S. welwitschii*, were collected and seed sent overseas to be examined for cortisone content. Progress has been made in the eradication of water hyacinth in rivers.

2024. TEA RESEARCH INSTITUTE OF CEYLON.

Annual Report of the Tea Research Institute of Ceylon for the year 1949, being Bull. 31, 1951, pp. 55.

Chemistry: Complete analyses of the ash of tea leaf grown at 3 elevations are tabulated, as are figures for fluorine content of tea grown on 3 soil formations. Tea is curious in that it accumulates unusually large amounts of Al, Mn, Fe and Cu but that so far no trace of B has been found. The systematic analysis of leaf harvested weekly and fortnightly throughout the year showed seasonal variation in composition but no differences due to plucking rounds. Studies are reported on the purification of the enzyme pectase, present in tea leaf, on the action of polyphenol oxidase in tea fermentation, on the composition of tea in relation to its manufacture and on many aspects of tea technology. *Plant Physiology*: The symptoms of K deficiency associated with the widespread deterioration of some areas of up-country tea are described. The selection, vegetative propagation and recording of clones was continued. Studies on the root systems of clones revealed that the rooting habit of an internode cutting is as much a specific clonal characteristic as yield, type of leaf, etc.; for convenience clones can be divided into 3 classes: vertical rooters, horizontal rooters and intermediate rooters, the majority belonging

to the third class. Seedlings showed a similar range of rooting habit. In trials of green manure crops *Crotalaria grahamiana* has given promising results. The NPK manurial trial, now in its 6th pruning cycle, has shown a further increase in responses to K. The Passara manurial trial, also in its 6th cycle, still continues to show the main response to N, although there are signs that a direct response to K may be developing; the effect of P is anomalous in that both alone and in interaction with K it has depressed yields, but this may possibly be due to enhanced weed growth. A plucking experiment, now in its 3rd cycle, has shown that fish leaf plucking gives a short-term increase in yield, but a marked decline in subsequent yields and deterioration in the condition of the bushes. *Pathology*: Work has been largely concentrated on the control of blister blight. In one trial to compare fungicides cuprous oxide (Perenox) and copper oxychloride (Blitox) gave very similar control; in another, involving 10 organic fungicides, only the dust Vitospor, which incorporates copper oxychloride, gave control comparable to Perenox. Weekly and fortnightly spraying with Perenox at 4 oz. in 10 gal. water, under N.E. monsoonal conditions, increased the weight of tippings by 44% and 37% respectively as compared with unsprayed controls. Progress has been made with spraying equipment. Observations made on other diseases and on several pests are recorded. Among the latter *Dinoderus minutus*, a common borer in tea chest timber, was effectively controlled with Gammexane LG.140 at 0.5% BHC, while cockchafer grubs, *Anomala* sp., were controlled in the field by dibbling in Gammexane powder D.025 at the rate of $\frac{1}{2}$ oz. per sq. yd. *Passara sub-station*: Comparisons of DDT and BHC against shot-hole borer suggest that the latter is the more effective. In a lime-wash experiment pruned tea bushes were cleaned with jute hessian, cleaned with hessian and lime-washed, lime-washed only or left untreated. Cleaning with hessian had no effect, but lime-washing produced a significantly earlier bud break though without affecting the final number of buds produced.

2025. INSTITUUT VOOR DE VEREDELING VAN TUINBOUWGEWASSEN, WAGENINGEN.

Jaarverslag Instituut voor de Veredeling van Tuinbouwgewassen, Wageningen, 1951, 1. (First A.R. of the Institute for the Breeding of Horticultural Crops, 1950), 1951, pp. 199, illus., fl. 5.

The work of this Institute falls into 3 categories: (1) the listing and classifying of Dutch and foreign varieties of vegetables, fruits, herbs and ornamentals, (2) the study of problems connected with variety testing, such as the development of test methods and cultural problems in so far as they affect varietal performance or breeding, and (3) breeding. In this first annual report extensive breeding work and variety trials with a large number of crops, listed alphabetically under the Dutch names, are reported. Several cultural trials are also summarized, including vegetative propagation trials with beetroot and blind cauliflower, investigations on seed production of brassicas, spinach and root crops, the effect of nitrogen, temperature and pH on the growth rate and colour of beetroot, lifting strawberries in autumn and overwintering them in a

cold cellar, and the economics of walnut production. In a section headed Special Investigations the following work is reported in some detail: (1) Vegetative propagation trials with fruit tree rootstocks, walnuts, hazel nuts and gooseberries; (2) Investigations on the physiology of propagation, including the use of insects in artificial pollination, observations on the flower biology of cabbage, vegetative propagation of a number of vegetables, and colchicine treatment of vegetables; (3) Investigations on the physiology of development, including the photoperiodic reaction of carrots and the light requirements of tomatoes; (4) Plant chemistry, including the development of an instrument to measure structural variation in fruits and vegetables for the purpose of estimating quality.

2026. WAITE AGRICULTURAL RESEARCH INSTITUTE.
Report of the Waite Agricultural Research Institute, S. Australia 1948-1949, 1951, pp. 68.

Subjects of horticultural interest mentioned in this report include the following: *Safflower*. Seed yields of the order of 1,500 lb./acre were obtained in 1948 and in 1949; detailed figures of varietal trials are tabulated. In former years the standard variety has been Niphad 630, but this has now been replaced by Selection 47-53, a strain which yielded seed with an oil content of 38% in each of the two seasons. Seed stocks of Selection 47-53 have been increased for further trials in country districts. *Tomato*. Tomato spotted wilt, the most serious disease of tomatoes in South Australia, has always proved the most difficult to control. In 1948 an Argentine variety, Rey de los Tempranos, was introduced from the United States and subsequently shown to possess resistance to the disease under local conditions. Its resistance was confirmed in 1949, and crosses have been made with a view to incorporating its resistance in local varieties. *Guayule rubber*. Plants in the plots under observation referred to in the report of 1943-1947 [*H.A.*, 20: 2173] continued to make growth to the end of the project in 1949. The maximum rubber contents for the plots are cited. The data collected over the whole period since sampling was started are now being prepared for publication by the C.S.I.R.O.

2027. WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Report of the West of Scotland Agricultural College for the year ending 30th September 1951, Glasgow, 1951, pp. 56.

In weed control trials sodium cyanate applied to onion and leek plots at a concentration of 20 lb. per 100 gal. when the weed seedlings were 1 in. high resulted in an almost 100% kill. Thirty newer early outdoor chrysanthemums were tested for a combination of good commercial quality and resistance to wet weather. Several selections of tomato hybrids, including some of Canadian origin, which showed high resistance to leaf mould and stem rot, were crossed with non-resistant, high quality, commercial varieties. Extensive potato disease investigations were conducted, and pests infesting potatoes, fruit and vegetables and ornamentals during the period under review are listed.

2028. WISCONSIN.

What's new in farm science, being 66th A.R. Part II Wisconsin Agricultural Experiment Station for 1949/50 and 1950/51, Madison, 1951, pp. 108, illus., issued as Bull. 492.

This popular account of work at the Station mentions briefly the following, among other, items. *Potatoes*: There is some evidence that mycorrhizas are responsible for tuber formation. Parzate, Dithane D-14 and copper zinc chromate gave better control of early blight than bordeaux mixture. Chlordane gave the best control of wireworms. Rugose mosaic is caused, not by a combination virus X and virus Y, as hitherto supposed, but by virus Y alone. *Tobacco*: Large amounts of chlorine in the manure and fertilizers applied to tobacco resulted in poor burning quality. Weed seeds in tobacco seedbeds can be controlled by fumigation with methyl bromide. *Fruit*: Experiments on the control of plum curculio, red-banded leaf roller, apple maggot and bud moth of apples and cherries. The effect of various fungicides on the quality of canning cherries. High potash fertilizers or unleached straw mulch reduced curl leaf in sour cherries. Marsh hay proved the best of 4 mulches for ever-bearing strawberries. *Vegetables*: An emulsion of dialkyl nitroaryl thiophosphates gave good control of borers in sweet corn. The use of low volume sprays was studied for control of pea, potato, cabbage and onion pests. Weed control experiments in red beet, carrots and gladioli are reported.

2029. ZÜRICH-OERLIKON (KOBLET, R.).

Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1949/50. (Report of the Zürich-Oerlikon Agricultural Research Station for 1949/50.

Landw. Jb. Schweiz, 1951, 65: 461-532.

Vegetables and potatoes were included in the seed material tested. Pests of potatoes, poppies and hops are enumerated. In trials to control Colorado beetle "Gesarol 50", "Gesacopper", aldrin and dieldrin were among the chemicals used and against cockchafer hexa, chlordane and aldrin preparations were tested. In comparative trials Etalon (parathion emulsion) was the only material which gave substantial reduction of green peach aphid populations on potatoes.

Periodicals.

2030. CHEESMAN, E. E. [JOURNAL OF POMOLOGY AND HORTICULTURAL SCIENCE].

Index to volumes XI-XX of the Journal of Pomology and Horticultural Science, Headley Brothers Ltd., 109 Kingsway, London, W.C.2, 1950, pp. 42, 10s.

Attention of readers is drawn to the second composite index of the leading British horticultural journal now known as the *Journal of Horticultural Science*. It consists of three parts, namely an index of contents, a subject index, and an author index, and should go far to making the contents of the journal easily available to the studios.

Noted.

2031.

- a AUSTRALIAN WINE BOARD.
*Twenty-third Annual Report of the
Australian Wine Board for year 1950-1951*,
Adelaide, 1951, pp. 18.
Production and exports.
- b DANISH SEED TESTING STATION (STAHL, C.).
Beretning fra Statsfrøkontrollen for det 79,

arbejdsår fra 1 juli 1949 til 30 juni 1950.
(Seventy-ninth Report of the Danish Seed
Testing Station for the year 1 July 1949-
30 June 1950.) [English summary 2 pp.]
Tidsskr. Planteavl, 1951, 54: 185-248.

- c EIRE.
*20th Annual Report of the Minister for
Agriculture 1950-51*, Dublin, pp. 188
+appendices pp. 84, 5s.

